COAL AGE

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What is a Coal-Mine Superintendent?

A coal-mine superintendent is a human being—if his salary is suddenly cut off, he might starve.

According to the reporters and the politicians he is a "hireling" of the terrible Coal Barons—whatever that (a hireling) may be or whoever they (the barons) may be—who spends most of his time tightening the shackles of industrial slavery around the common everyday people who are under him, hoping that the millionaires above him may become billionaires.

According to the "know it alls," he is the only man around a mining camp who does not have to stand an examination before receiving an appointment. If these same "know it alls" were asked to question the applicants for superintendents' positions and judge of their abilities, they (the "know it alls") would probably suddenly find that they had important business in other states.

"A coal mine superintendent is a human being . . . who keeps balky coal mines running"—which is quite contrary to the general opinion of a few prejudiced, uninformed individuals.

The shyster lawyers, in addressing juries, when superintendents are pitted against them as witnesses, refer to them as sycophantic gentlemen, with especial emphasis on the gentlemen; but their judgments should not be given very much weight, because when circumstances are such that these same lawyers have settlements to obtain that can only be obtained through superintendents they seem perfectly willing to treat with the superintendents and never question their promises.

The ladies of the camp who think that their houses need repairs or that their husbands merit promotion or better working-places look upon the superintendent as selfish and ungrateful—but their testimony is not disinterested and likewise should be given little weight.

When a group of mines are consolidated and a mine foreman assumes the responsibilities formerly carried by a superintendent in their camp, the ladies flood the general manager's office with petitions of protest assuring him that they won't live in a camp that can't afford a superintendent.

The directors of a company believe that the superintendent is the stumbling-block that robs them of all their dividends. He is always, according to them, springing some welfare work or liability fund or pension allowance to absorb every last cent of surplus, and not satisfied with that, he insists that an appropriation or two must be allowed for improvements if he is to compete with his neighbors.

To his family the superintendent is a man who has his mind on his work 24 hours in every day. Between attempting to prevent things that might happen and trying to correct things that have already happened, he has little time for himself or the family. While the rest of the community is discussing gardens and clothes he is telling his family about the gas feeder in the "9th right" or the commutator that went bad at the pump station.

Why do we want coal-mine superintendents anyway?

Because they are the fellows who keep balky mines running and incidentally make it possible for most of their critics to earn a living.

A Kentucky Mining Success

By J. E. Butler*

SYNOPSIS—Details of a plant that embodies in its construction ideas that are really new and to some extent original. Everything is automatic that can at present be made so. Something about Mr. Petersen, the designer.

The greatest prospective coal-mining success that I have seen this year is at Hazard, Ky. It is the equipment of a mine for the Ashless Coal Co. furnished by O. G. Petersen, of the Associated Engineering Co. I say "prospective success," for many of the ideas embodied are new to coal-mining practice and will have to be adapted to the work. Management and engineering skill will have much to do with the final result. Assuming that the proposed plans will work out as designed, some economies of a radical nature will have been secured. We often hear the term "modern equipment" applied to coal plants, and in this instance the expression seems to fit.

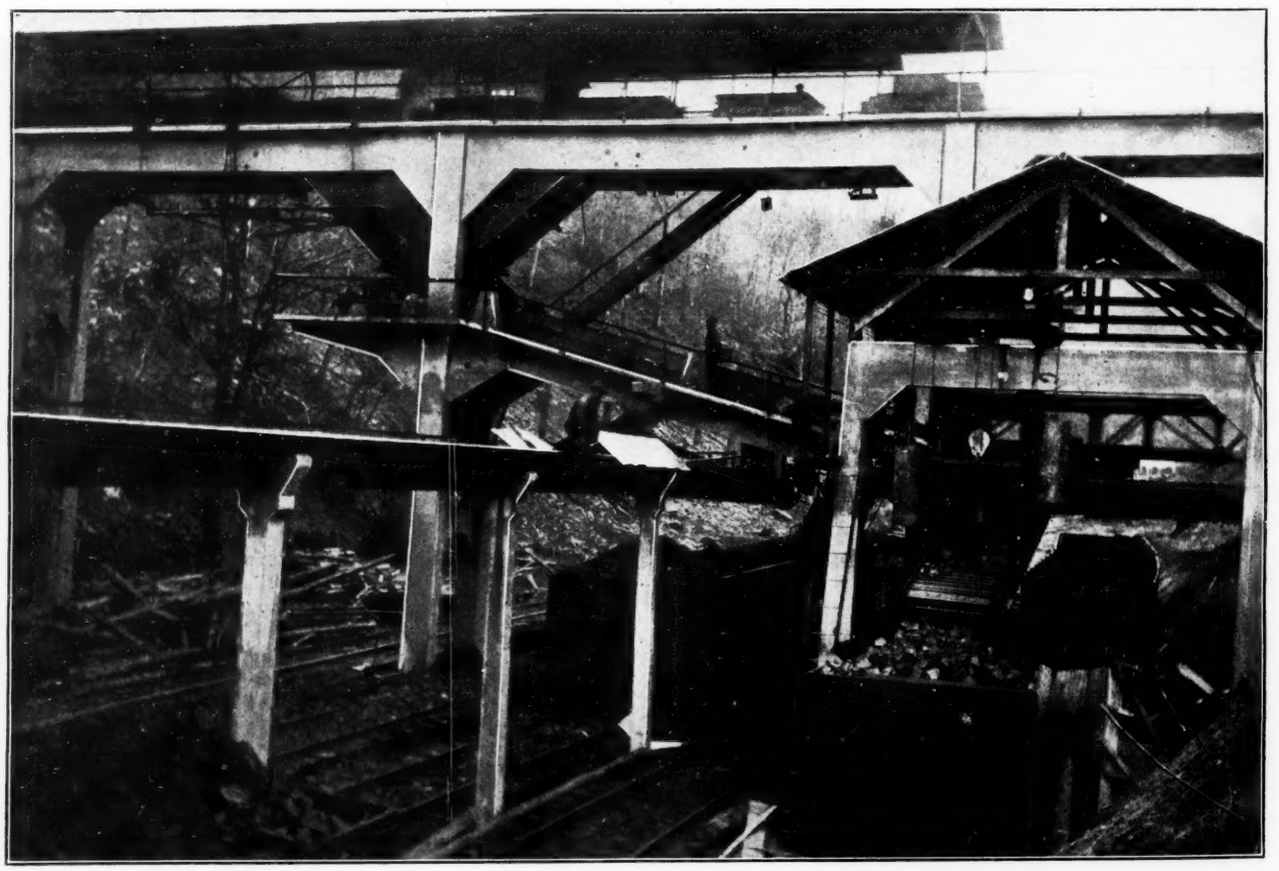
The surface structures, classic in appearance, are of reinforced concrete. The power plant is a marvel of neatness and compactness and is equipped with two 150-hp. return-tubular boilers with steel jackets and one 200-kw. Curtiss turbine, occupying one open room in a building of neat design. The fuel is received directly from the tipple screens on a cable conveyor, which delivers it to the boiler-house bins, immediately behind the oven doors. Only one operative is required in this plant.

In addition to the power plant the mine equipment embraces several noteworthy features. The undercutting chain machines furnished by the Sullivan Machinery Co. have General Electric alternating-current motors, operating at 440 volts. This change from the direct current will permit extensive development without excessive copper-wire costs.

Storage-Battery Locomotives

Haulage power is furnished by storage-battery locomotives of General Electric construction. The absence of a network of dangerous overhead trolley wires is noted with satisfaction as is also the absence of bonds. With the present service the locomotives will run 14 hr. without recharging. The recharging is done in about 7 hr. at night and serves to distribute the load on the power plant.

The Streeter-Amet automatic scales of 20-ton capacity are used. There are two platforms accommodating loads from each side of the mountain, connected to one beam or recording device. This feature eliminates the disputes regarding weights between miner and company. The load passes over the scale, and the recording device does the rest.



Showing Concrete Tipple Construction with Screening and Weighing Arrangements

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The mine cars were built by the Sanford-Day Iron Works, of Knoxville, according to plans furnished by Mr. Petersen. Dumping of coal is brought about by a trip which automatically releases the bottom fasteners, and the coal slides out of the car into a 30-ton steel hopper. The bottoms in turn are closed and secured automatically by idler pulleys in the floor of the tipple, over which the car is hauled as soon as it is unloaded. This bottom dumping feature will undoubtedly excite the criticism of car builders throughout the country, and it will be interesting to see if the arrangement will stand up under service.

The tipple is really a bridge some 40 ft. high by 400 ft. long spanning a narrow valley, on each side of which, at tipple height, are the mine openings. The massive beams and columns of concrete are not without architectural beauty and show up in striking contrast to the jumble of wood and machinery which usually passes for a tipple. This structure spans four tracks, providing for that number of grades of coal at one operation, and supports the scales, receiving hopper, screens and loading boom. The box-car loader is on a separate pedestal.

How the Coal Is Handled

With the aid of these and other features the coal is handled with great facility. It is undercut, shot, loaded in the car and pushed to the room parting by the miner. The motorman and trip-rider with the storage-battery locomotive gather the cars into trips and haul them to the tipple, where without delay, interruption or any assistance, the coal is automatically weighed and dumped and the car bottoms are closed and made secure. The train then passes on into the opposite side of the mine as an empty trip.

At the bottom of the receiving hopper is a feeder plate which delivers the coal gradually to the shaker screen. The screens are 40 ft. in length by 5 ft. in width, giving ample screening capacity. They are driven by a geared motor, and have the short pendulum swing peculiar to Petersen installations. The lump coal is delivered to a loading boom, which has a horizontal table for slate-picking purposes, and continuous with this is an incline conveyor which lowers the coal without breakage into the railway car. This boom may be hoisted or lowered at the will of the operator so that coal may be discharged at any level desired in the gondola car, or the whole boom may be moved laterally so as to bring the discharge end opposite a box-car door for box-car loading.

The railway cars are controlled from the screen floor of the tipple by means of car retarders of ample capacity. The builders intend that but three men shall be required to operate the tipple; namely, one on the deck floor to supervise the unloading and the scales, one on the screening floor to control by means of switches and levers the screens and the loading boom and the car retarders and one on the ground to take care of the railway cars.

One has only to review the main features of this installation—namely, the alternating-current coal-cutting machines, the storage-battery locomotives, the automatic scales, the automatic dumping of cars, the car retarders with boom and screen controlled by single operator, the delivery of coal to the power house and the simplicity of the power unit—and compare them with the ordinary coal-mining outfit to appreciate that there are here combined more features tending to economy of operation than are usually found in American plants.

The designer of this plant is Oluf G. Petersen, president of the Associated Engineering Co. Mr. Petersen was born of Danish and German parentage in Erie, Penn., in 1876. His forefathers were pipe-organ builders, and he retains the instincts of his forbears—he is a builder. As a boy he amused himself building miniature telephones, repairing old gasoline engines and setting up marvelous electrical installations. He knows machines as a mother knows her babe. He has nursed them in his bosom, cried over them, fondled them, fought for them and bled for them. While rearing machines of various kinds, incidentally he completed a course in mechanical engineering in Michigan University at Ann Arbor, which place was at that time his home. His knowledge of machines and other less important things secured him a position on leaving college at the Ishpeming High School, where he spent a couple of years teaching the young men how to work with their hands, use tools and run machines; in other words, he gave the boys manual training. He continued this work for several years at Milwaukee, Wis., both in schools and in shops. At the end of that time he took a position as engineer for the Stearns Coal & Lumber Co. and the Kentucky & Tennessee Ry., at Stearns, Ky. After building for these companies the first motor-driven sawmill in the United States and the first tipple entirely of concrete to use shaker screens, he resigned to organize the Associated Engineering Co. for the purpose of giving exclusive attention to the building of surface equipment for coal mines.

Mr. Petersen has given special attention to handling coal on the surface and has secured a list of patents covering the bottom-dumping cars, adjustable screens, a movable loading boom, an automatic tipping and closing device for the bottom-dumping cars, a box-car loader and a spiral block coal loader, all of which are destined to reduce the cost and improve the quality of prepared coal.

Powder Magazines

A dugout in the side of a hill is often considered a good place in which to store explosives. This, however, is a mistake, and such a magazine is ultimately an expensive one, because the efficiency of the explosive, on account of its moisture-absorbing properties, falls off very rapidly when the powder is stored underground. Powder magazines should be constructed, and for this a good material is brick. Stone or concrete or similar materials—which in the event of an explosion would be converted into projectiles and would do damage to surrounding property—should not be used. Brick is pulverized into dust by a dynamite explosion and does no harm.

Powder magazines should have bullet-proof doors, and where this is not feasible the doorways should be protected by a screen or barricade. It is advisable to surround the entire magazine with a similar barrier. It requires 11 in. of sand to stop a bullet fired at ordinary range from a modern high-power rifle using smokeless powder, such as is occasionally used now by hunters.

As has often been suggested before, to sink the entire building behind a heavy earthen parapet is the safest method. Then anything which can be converted into a projectile by an explosion must travel with a high trajectory in order to do any damage, which is much safer for the surroundings than if the magazine were in point-blank range.—From *Engineering News*.

The Purchase of Coal

By Morgan B. Smith

SYNOPSIS—Some factors which ought to be considered by the consumer when purchasing coal.

In connection with the purchase of coal two questions arise, both of which may seem odd but which nevertheless bring forward intensely practical answers. The first is, *Why* does the consumer purchase coal? and the second, *How* does the consumer purchase coal? The first question may be answered by the simple statement that the coal is bought for heating purposes. This answer is ready and straight to the point; but how about the second question—can this be answered as readily as the first? Unless the purchaser has been through the mill thoroughly he will state that he buys coal from his dealer at so much per ton, plus freight charges, and then puts it in storage in field or bunkers or perhaps burns it at once in the furnaces.

It is worth while to consider the answer to the second question. There is more involved in the purchase than mere tonnage. The purchaser himself admits that it is heating value which he desires. Therefore, he should look for heating value per ton of coal bought and also for nonheating properties in the coal.

Stop to consider, then, some of the factors to which the consumer ought to give attention when purchasing coal for his plant. In the first place, he is forced by current practice to buy "tons of coal," regardless of the true value to him, unless he is in a position to insist upon "heating value per ton of coal."

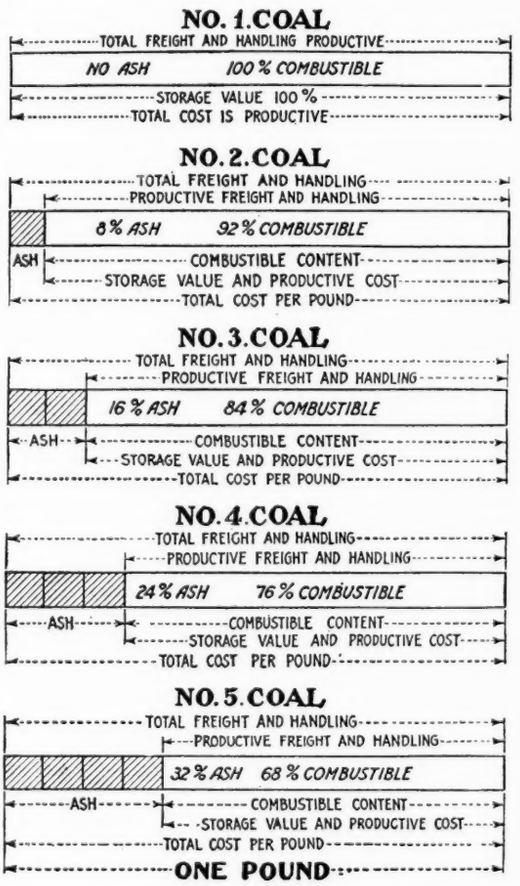
What does this mean to the consumer? It means that he is paying for mere weight of coal, for freight on mere tons, for handling at the plant of mere tons, for crushing mere weight, for storage of weight only, for burning weight only and for handling ashes—all based upon mere avoirdupois rather than upon heat value. Is this common sense or good judgment? Hardly.

Supposing that he is in a position to insist upon heating value in every ton of coal which he purchases, and to make his insistence strong by means of the proper tests on all coal received at the plant. What then? The purchase of coal then becomes a matter, not of mere tons, but of heat units per ton or per pound, a measure of the coal's real value.

When the purchaser has reached this position regarding coal, he can then go ahead and by comparative tests select the coal best suited to his plant equipment. That coal which is by its characteristics best adapted to the conditions of the plant and the load is the highest grade usable, regardless of cost.

It is customary to state the heat value of coal in terms of heat units per unit of weight, generally stated as British thermal units per pound (B.t.u. per lb.) based on the sample dried at 105 deg. C. for one hour. Unless the exact characteristics of the coal are known, a pound of it may have diverse meanings to the buyer. To make this clear, the accompanying diagram has been made to illustrate graphically how "one pound of coal" may have great significance when all costs and efficiency in the plant are considered.

Assume the intial cost at the mines to be the same for each of the five coals shown. How much of the total cost is productive? Only that portion represented by the heat content of the coal purchased. How much of the total cost is loss? The difference between the total cost and the productive cost. The content of fixed carbon and volatile matter is a measure of the productive cost, whereas the ash content is the nonproductive cost. Which is wanted, heat value or ash?



Diverse Meanings of One Pound of Coal to Consumer

No. 1 coal is a purely hypothetical coal, not found in nature, but shown here for the sake of comparison only. Coals Nos. 2 to 5 are representative of coals on the market and show a common range of characteristics. Which of these coals will give the best results in cost and efficiency in the plant, from mines to bunkers and ultimately to the ash dump? Does storage value mean anything when, through strikes at the mines or stoppage of transportation by floods, the plant is threatened with a shutdown? If so, which of the four coals would it be preferable to have the bunkers or field filled with in such emergency?

The cost does not stop with the original price per ton plus freight, for handling, crushing, storing charges on the coal and also handling of the resultant ash must still be covered. It is generally conceded that coal high

in ash and sulphur is harder on all handling apparatus than a coal of lower ash and sulphur content. The costs for upkeep of apparatus will then be in proportion to the wear and tear upon such equipment. In the furnaces evolution of heat is the desired output and will vary directly with the heat content of the coal used. The higher the heat value, the greater the amount of heat liberated, all other conditions being similar. Finally there are the charges for handling the ashes produced.

In general, it may be said that the higher the quality of coal which the plant will handle economically, the lower will be the cost and the greater the efficiency of the plant. It is not necessary that the dealer be held to a strict specification of properties of the coal purchased, although it is wise for the purchaser to accquaint himself with such characteristics and for his own satisfaction formulate a specified analysis. He will find that daily tests on all coal received at the plant, or possibly weekly averages, will afford him valuable data, and if he sends copies of all such tests to his dealer, he will find himself possessed of powerful ammunition with which to convince the dealer that it is to his interests, as well as those of the purchaser, to furnish the coal desired. Such an arrangement tends toward mutual satisfaction since it places both parties to the contract on an equitable footing.

The tests which should be made regularly are those to determine the heat value per pound of coal as fired, ash content as fired and percentage of sulphur. These tests give all the required data. Other tests may be made, often of value to the consumer, such as the determination of fixed carbon and volatile matter. Moisture must always be determined in order to calculate the coal to the condition "as fired" or net weight of coal burned. These are simple tests, and the apparatus is not expensive when the results are considered. By all means adopt the oxygen-bomb type of calorimeter for determining the heat value of coal. Other calorimeters are at best only approximate in their results, although cheaper in first cost.

The purpose has been to point out the real meaning of "coal" to the purchaser and consumer and to emphasize the fact that only by knowing the fuel can the user reach that degree of standardization in his fuel purchase and combustion which has been the real factor in producing the high efficiency of the modern power plant. It is a fact that uniform fuel means uniform and economical operation in the plant.

Extracts from a Superintendent's Diary

Today we had an unusual visitor, an authoress who is touring the entire country in search of material for her next book—a short, rather stout, middle-aged woman, with kindly eyes and a captivating smile. She carried no letters of introduction and needed none.

In recalling the interview I had with her, I realize that she was an interviewer of the highest ability. Even while explaining to me her mission in our camp, she did not monopolize the conversation, but encouraged me to do a good deal of talking; and I managed to tell her that I also aspired to literary distinction, and as an initial step several years back I began an elaborate diary, which I have religiously continued to this day.

My confession pleased her very much. She was not in search of adventures, but rather of intimate pen pictures, covering all trades and industries; and she felt sure that any one who philosophized over his lifework with enough seriousness to make diary entries would be able to recall many gripping scenes—that is the way she put it.

She had met many big men connected with various industries, but almost without exception they could talk interestingly only when allowed to suggest that the industry with which they happened to be connected was the keystone to all industry.

Getting personal, she assured me that, had she omitted to forewarn me, I would have seized the first opportunity to explain that if all coal mines were suddenly blown up or rendered useless, all industry on the face of the globe would be paralyzed; how could ships travel, trains move and factories operate then? "And with a very little encouragement," she continued, "the picture of the coal-mining industry that you might suggest for me would become so magnificent that I might feel that little else in the world really counted."

"Even at that," I replied, "I might not be overrating as much as you suspect."

Foolish man! That was exactly the reply she most desired; she admitted as much when she was taking leave. Experience had taught her that men hold nothing back once they find themselves on the defensive, and in recalling what followed, her method seems almost uncanny. If she publishes all that I told her, my diary to date will have been published. But I have some consolation in the fact that she was made to realize that the terrible coal baron gets credit for many things that properly belong to others.

I happened to relate a little adventure staged in a New York tenement during the past winter. A college friend of mine who had given up a business career to enter social-settlement work had induced me to make a trip with him through some New York tenements, hoping that I might absorb a proper feeling for the "down and outs" of this world, as he expressed it.

The day was extremely cold, and in all of the rooms where we gained admittance the occupants seemed to be mostly occupied in trying to keep warm by huddling around small stoves or grates in which burned a few precious coals.

The climax was reached when we entered a room where a mother was weeping over a child lying stiff in death, frozen because the few lumps of coal, bought with the mother's last pennies, proved to be mostly slate and bone.

"What a reflection on the coal-mining industry," said my friend.

I didn't let it rest there. My friend knows now, and the authoress realizes also, that the average coal-mine owner has about as much control over the prices and practices of the coal peddlers in distant cities as does a cow over the milk peddler who sells water for milk.

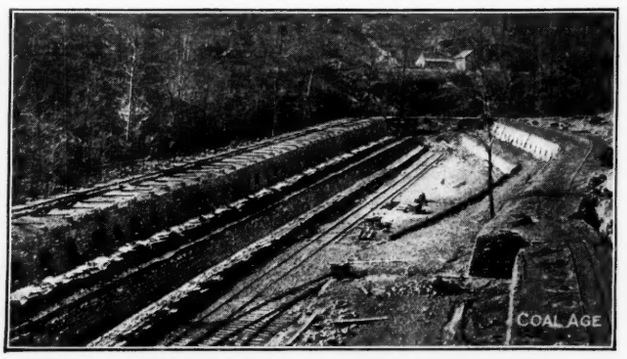
Some Cause for Complaint

The following was found at a certain mine on the bulletin board where machine-runners mark up their troubles:

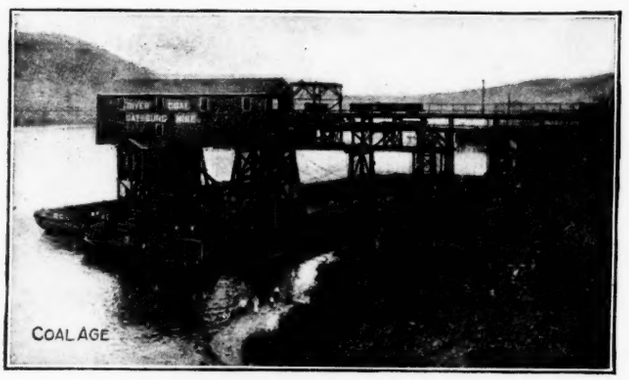
"No. 4 Masheen awl Shot tu hel. Chain brok. fix the dam thing. it brok twist Last nite. needs new rear staff leaves for resisting box. amatoor smokes like heltoo. Power bad. lots of short circles. this is the masheen with self compeller truck. Wer outa oil tu."

Snapshots in Coal Mining

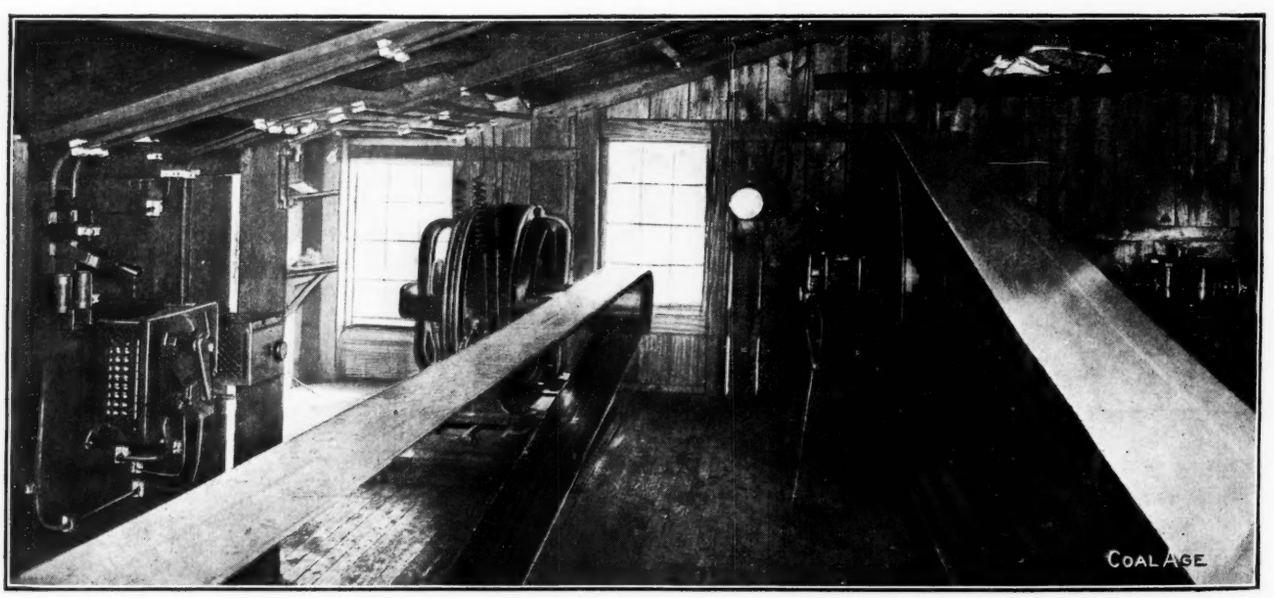
This Tree Dropped into a Mine at Nanticoke, Penn., and Slid Down the Pitch 500 Ft. The Coal Seam Here Is 20 Ft. Thick, So Some Idea of the Tree's Size Can Be Formed



Coke Ovens of Chattanooga Coal & Iron Co., Dunlap, Penn.



Catsburg Coal Tipple, Monongahela, Penn.



75-Hp., 220-Volt Shunt-Wound Motor Driving 18-Ft. Downcast Fan through Countershafting, North Franklin Colliery, Trevorton, Penn.

Development of a Circuit Controller

By A. R. Anderson*

SYNOPSIS—The primary conception of a circuit-breaker is that it should interrupt the circuit whenever the amount of current becomes excessive. This article describes an instrument which not only performs the function of a circuit-breaker, but closes the circuit as soon as conditions have again become normal.

In practically all systems involving the generation and utilization of power there are to be found protective devices of some kind. The original conception of such a contrivance seems to have been that it should protect the apparatus from abnormal conditions in the nature of overloads. But there is another element in a system involving the generation and utilization of power which needs protection, and the abuse of which may prove quite as costly as the abuse of apparatus. This element is service.

Referring specifically to electrical systems using protective devices in the form of circuit-breakers, it is quite as important that the service be resumed promptly upon the disappearance of abnormal conditions as that it be interrupted upon their appearance. Were abnormal conditions to come about comparatively slowly it would be possible for an operator to sense them and interrupt the circuit before damage could be done. But generally these conditions occur so quickly that it is absolutely necessary to provide automatic means, quicker than the human eye or hand, for interrupting the circuit.

This function of a protective device therefore has always been evident. The other function of responding instantly to a return to normal conditions as well as a departure therefrom and thus protecting the service has been given comparatively little thought. Its importance has perhaps been overlooked because this function can be accomplished by hand.

In large distribution systems with many generating units and much auxiliary apparatus tied together in a complete network, there are so many elements influencing the restoration to normal conditions after a circuit has been interrupted that it is hard to conceive of an apparatus that will supplant human intelligence in directing this restoration. But in simple direct-current distributing systems such as are used in practically all coal mines and in all feeder circuits taken directly from the main busbars the function of restoring service instantly upon the return of normal line conditions may be accomplished by the use of automatic circuit controllers.

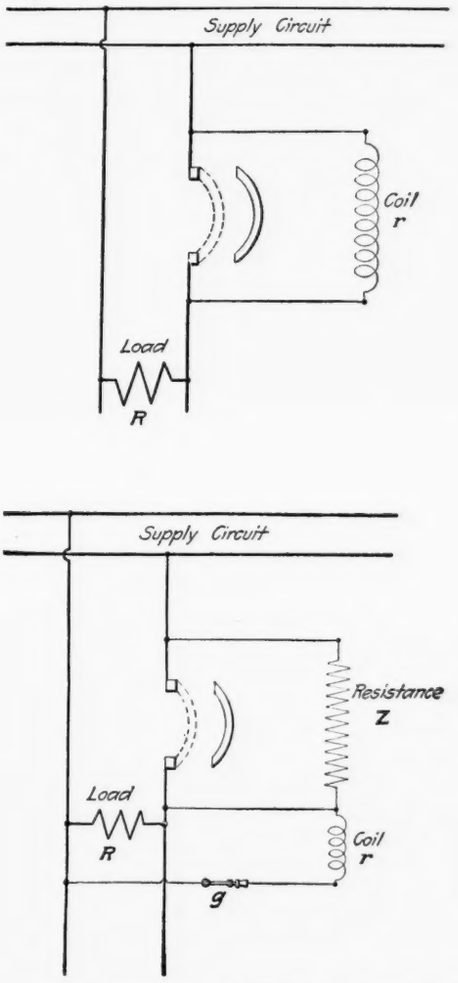
The automatic circuit controller made by the Automatic Reclosing Circuit Breaker Co., Columbus, Ohio, is essentially a solenoid-operated circuit-breaker which is opened on overload by a plunger actuated by a coil in series with the load and tripping open the circuit which energizes the operating solenoid. After opening the circuit the operating solenoid cannot again be closed until a contact in the circuit is closed by the plunger of an auxiliary coil called a trip coil.

*Electrical engineer, Columbus, Ohio.

The operation of the plunger in the trip coil is dependent upon the load resistance. The plunger will therefore not operate until the resistance of the load has increased to a point where the value of current that will flow upon closing the breaker will not exceed full load. At any value of load resistance above this the breaker will close automatically, opening only on overload and staying open only so long as this overload condition remains.

A Brief History of the Development of the Controller

The electrical circuits of the automatic circuit controller may best be understood through a brief history



Figs. 1 and 2. Successive Steps in the Development of the Apparatus

of their development. The first idea for the operation of the trip coil which presented itself to E. C. Raney, the inventor of the automatic circuit controller, was to shunt the trip coil around the breaker when opened so that a certain "index" current would traverse this coil through the short-circuit or decreased load resistance to the other side of the line. The current through the trip coil would

hold the plunger up until a sufficient increase in the load resistance would decrease the index current, allowing the plunger to drop and close the circuit through the operating solenoid.

The electrical circuits for such a device are shown in Fig. 1. The objections to this arrangement, however, are the high value of index current required for even a theoretically appreciable variation in it due to change in load resistance, the interference of voltage variation within commercial limits with the determination of a point of operation fixed with reference to the load resistance, and the erratic performance of an iron-core solenoid on decreasing current, the point of release depending on the previous degree of magnetization as well as the value of current flowing through the solenoid.

A concrete example will serve to illustrate difficulties with this arrangement. Assume a circuit supplied from a 250-volt, 150-kw. generator. The breaker in this circuit is set at 800 amp. The minimum value of load resistance R on which the breaker will stay closed is therefore $\frac{250}{800} = 0.312$ ohm. Suppose there are constant loads such as lights, etc., on the line to the amount of 100 amp. This is equivalent to a load resistance of 2.5 ohms, and when the breaker has opened, the load resistance cannot be expected to rise above this value to operate the trip coil which closes the circuit through the operating coil.

The trip coil must be sufficiently sensitive to respond to a variation in load resistance from a value of 0.312 ohm to a value between 0.312 ohm and 2.5 ohms. Let it be assumed that the resistance r of the trip coil is 10 ohms. Then when the overload occurs the resistance of the trip coil and load is $(r + R)$, or 10.312 ohms, and the current which flows with 250 volts at the generator is 24.2 amperes.

On this value of current the coil must not operate, but must hold until the value of current has dropped below it. The minimum value to which the current may drop is obtained when the load resistance increases to 2.5 ohms and is $\frac{250}{12.5} = 20$ amperes.

The maximum drop in current obtained by this means with constant voltage is only 17 per cent. and the practical difficulty of obtaining reliable operation of the trip coil with so small a variation in current is at once evident. Add to this the possibility of the line voltage varying this much, especially if the breaker is connected to a supply circuit at some distance from the power house and the considerable value of index current which must be handled and the difficulties connected with this arrangement for practical apparatus are apparent.

The Instrument Was More Sensitive with Increasing Currents

In experimenting with this type of circuit, however, it was noticed that the trip coil responded more readily and at a more definite point with an increasing than with a decreasing current. This led to the idea of connecting the load circuit and trip coil in parallel around the open breaker, using an auxiliary resistance to keep down the value of index current. This arrangement of circuits is shown in Fig. 2, where R is the load resistance, r the resistance of the trip coil, and Z is the auxiliary resistance.

The resistance of the trip coil r approximates R or that of the load, while the resistance Z is comparatively high. Attention is called to the fact that the trip coil having approximately the resistance of the load circuit may not be left connected in when the breaker is closed, as it would constitute practically a short-circuit across the line. Mechanical means are therefore provided for opening this circuit before the breaker closes.

Evidently with this arrangement the current through the trip coil with constant resistance r increases with an increase of the load resistance R. But this arrangement affords another advantage in point of sensibility and which is in reality the keynote to the practical success of this breaker.

An example will illustrate: The same generator and load conditions as above are assumed. In this arrangement, however, the resistance of the trip coil r is 1 ohm and the resistance Z is 125 ohms. With 250 volts on the line and load resistance of 0.312 ohm, the following currents are flowing after the breaker has opened: Through Z, 2 amp.; through R, 1.52 amp.; through r, 0.48 amp. After the load resistance has increased to 2.5 ohms, the following currents are flowing: Through Z, 1.99 amp.; through R, 0.57 amp.; through r, 1.42 amp.

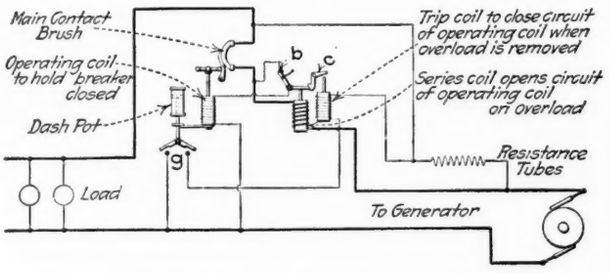


Fig. 3. Theoretical Diagram of Electrical Circuits

The increase of current through the trip coil has been 195 per cent., as compared to a decrease of only 17 per cent. in the previous arrangement, and the index current which the apparatus has to handle does not exceed 2 amp., as compared to over 24 amp. in the previous arrangement. This feature of the divided circuit is the very heart or rather brains of the machine, for it gives it the sensibility in responding to the changes in load resistance necessary to make its practical operation successful.

A complete theoretical diagram of the electrical circuits of a single controller is shown in Fig. 3. The main contact brush is moved to the closed position and held closed by the operating coil which is connected across the line through the contact b. When an overload occurs the plunger in the series coil rises and opens the contact at b, which is held open by the latch c. The breaker will close again only when the trip coil is energized sufficiently to raise its plunger and kick out the latch c.

The trip coil is connected around the breaker through the bridge g to the opposite side of the line. It is thus in parallel with the short-circuit and the combined current through the trip coil and short-circuit is kept down to about 2 amp. by the resistance tubes shown. The bridge is supported by the piston of a dash pot, which descends slowly at a predetermined rate, which may be adjusted from 1 to 40 sec. The trip coil cannot operate and cause the breaker to close until this bridge is down, no matter what the condition of the load circuit may be.

The object of introducing this time element is to allow sufficient time for motors to come to rest and starting-box levers to return to starting position before the breaker closes. After the bridge *g* is down the breaker will close, provided the overload condition of the line has disappeared; that is, provided the load resistance has increased above the full-load value, thereby diverting sufficient current through the trip coil to operate its plunger.

If, however, the load resistance is still below full-load value, enough of the index current to operate the trip coil will not traverse it and so the breaker will remain open. When the load resistance increases to the proper value the trip coil operates, the operating coil is energized, the plunger therein rises, raising at the same time the piston of the dash pot and lifting the bridge off the contacts at *g*, and finally closing the main contact brush. Thus it is seen how the trip-coil circuit is open before the main circuit through the breaker is closed and the possibility of the trip-coil circuit forming a short across the line precluded.

This Breaker Is Not Adapted to Generators in Parallel

From the above considerations it may be easily seen that a breaker as described may not be used where the load side

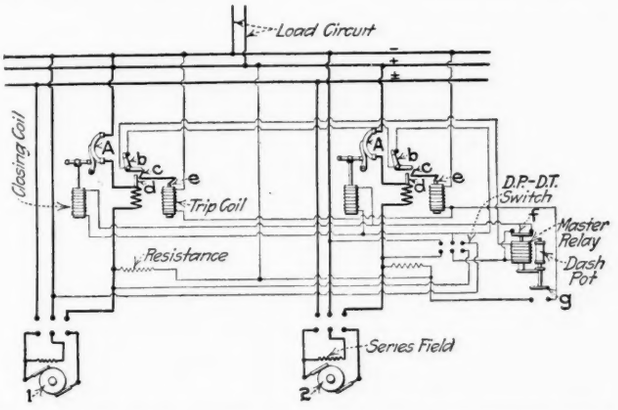


Fig. 4. Electrical Connections for Two Generators in Parallel

is supplied from sources of power other than through the breaker in question. In other words, a breaker as described may not be used in the circuits of generators operating in parallel and feeding into the same busbars or network without some modification.

The modifications necessary in order to adapt the breaker to the circuits of generators operating in parallel have been worked out and the theoretical diagram of the electrical circuits of such an arrangement for two generators so operating and feeding into the same busbars is shown in Fig. 4. The modification consists essentially in removing the dash pot and bridge from the individual breaker, using only one dash pot for all the breakers and operating it by means of a master relay.

In this arrangement the contacts *b*, connected in series, are placed in the circuit of the master relay instead of that of the operating coil as in a single breaker, and the master relay at the point *f* controls the circuit through the operating coils of the breakers which are connected in parallel. The trip coils are also similarly connected and the circuit through them is closed by the single bridge *g*. Fig. 4 shows the breakers in the closed position.

In the case of an overload on either generator, one of the contacts at *b* is opened by the plunger *d* of the series coil in the same manner as in a single breaker. This opens the circuit through the master relay, the plunger of which drops and opens the contacts at *f*, thereby opening the circuit through all the operating coils and causing all the breakers to open.

After a certain time limit, depending upon the adjustment of the dash pot, the bridge *g* is closed and the trip coils will operate to release the latches *c*, provided the load resistance has increased to the proper value. When the latches are released, all open contacts at *b* are closed, throwing the master relay across the line, lifting the bridge *g* and closing the circuit through all the operating coils at *f*, thus closing all the breakers. Regardless of whether the overload occurs on one or all the generators, all the breakers open simultaneously and close simultaneously.

By means of a suitable switch, the master relay may be excited from either generator desired. Any generator and its circuit-breaker may be operated independently by opening the operating coil circuit and trip-coil circuit of the other breakers by means of switches provided for that purpose.

Controlling the Direct-Current Circuits

Automatic circuit controllers fulfill the four functions necessary for the complete control of direct-current circuits with reference to overload conditions:

1. They interrupt the current quickly in case of short-circuit or overload.
2. They permit of a certain time to elapse after the circuit is opened before it is again closed, regardless of whether the short-circuit has disappeared or not. This protects motors and similar apparatus on the line.
3. They will not close the circuit while the short-circuit still exists.
4. They close the circuit instantly upon the removal of the short-circuit, after the time limit has expired.

Many fields of application for these breakers will suggest themselves. With increased use of purchased power, the automatic control of the direct-current side of motor-generator sets and rotary converters presents a large field where they may be profitably employed. Their use generally dispenses with the continuous services of an attendant at substations and avoids unecessary delays incidental to closing a manually operated breaker. Their installation on branch circuits serves to localize troubles and avoid shutting down the entire system. About mines and mills especially installations of this kind possess marked economic advantages.

In general, automatic circuit controllers not only protect apparatus and service, thereby insuring maximum output and a minimum overhead expense per unit of production, but also present the opportunity of reducing operating cost.

Electrical resistance varies greatly with different metals, and is in general less for a pure metal than for any of its alloys. Its value in every case depends upon the length of the wire, its cross-sectional area, and the nature or chemical composition of the metal, all of which vary with temperature. Increasing or decreasing the length of any conductor will increase or decrease the resistance in direct proportion. Increasing or decreasing the cross-sectional area will inversely affect resistance; that is, as the section of the conductor increases, the resistance becomes proportionately less and vice versa.

Indiana Coal Operators Seek Aid in Washington

The communications below indicate steps being taken by the bituminous coal men of Indiana, who are endeavoring to find a way out of their present unsatisfactory business conditions. Mr. Callbreath, secretary of the American Mining Congress, acted for the operators in the matter of getting President Wilson's attention. The exchange of letters and the statement of the operators follow:

Hon. Woodrow Wilson, President of the United States,
White House, Washington, D. C.

My dear Mr. President: At the request of a committee of Indiana coal operators, who were unable to present this to you personally because of your absence from the city on Tuesday, I beg to present to you a statement concerning the bituminous coal mining industry.

This committee consisted of Messrs. Carl Scholz, president of the Consolidated Indiana Coal Co.; Walter S. Bogle, of W. S. Bogle & Co.; John T. Connery, president of the Miami Coal Mining Co.; J. C. Kolsem, of the Jackson Hill Coal & Coke Co.; Hugh Shirkie, of the Shirkie Coal Co., and Morton L. Gould, of the Gould Coal Washing & Mining Co.

Will you permit me first to present a few general statements concerning the bituminous coal-mining industry at large as a preliminary to the more concise reference to the Indiana situation?

First, more than 500,000 workmen engaged in the bituminous coal industry are necessarily idle more than 100 days each year.

Second, more than $900,000,000 of the capital engaged in the bituminous coal industry is idle more than 100 days each year.

Third, approximately 200,000,000 tons of the nation's fuel supply is being wasted each year.

Fourth, about 100,000 acres of coal lands are being exhausted each year, while with proper conservation 65,000 acres could be made to furnish the fuel now used by the nation.

For the last five years the average selling price of bituminous coal at the mine has approximated $1.12 per ton, while the cost of labor and supplies for each ton produced has approximated 96c., leaving but 16c. per ton to pay for the mine, the depreciation of machinery, selling charges, overhead expenses and the risk which always exists of a mine disaster through which the whole capital involved in the enterprise might be destroyed.

The Indiana committee presented this matter to the Federal Trade Commission, believing it had authority to permit such coöperation between the operators as would enable them to partly relieve this situation. I attach hereto a condensation of the statement made to the Federal Trade Commission. The commission expressed full sympathy and its desire to lend any possible assistance, but stated that under the law it had no authority to take any affirmative action in the premises.

The same statements were presented to the Department of Justice, able to punish in case the proposed plan of cooperation to stop the waste should in any way transgress the law, but that department was unable to give guiding advice.

The Indiana operators believe that this enormous waste of the nation's fuel supply is of sufficient public importance to justify an appeal to you as the President of the nation to lend a helping hand through such agencies as may be available. Respectfully submitted,

J. F. Callbreath,
Secretary.

Statement of the Indiana Operators

The Indiana bituminous coal operators find themselves suffering from overproduction and intense, unrestrained competition, with the result that a number of the operators have been forced into the hands of receivers, and a large number of the balance are suffering seriously from the situation.

The condition affects the laborer equally with the operator, because of intermittent work. During the year 1914 they secured only 148 working-days. The result is the entire absence of conservation. On the contrary, it promotes a waste of coal in the ground because it requires the cheapest and easiest method of getting coal out, to meet the price at which it has to be sold. On a conservative estimate not more than 50 per cent. of the coal is recovered.

This means that in the United States as a whole upward of 200,000,000 tons of coal are wasted each year.

There are 114 companies in the State of Indiana producing 16,000,000 tons of coal each year—a little over 2 per cent. of the total production in the United States—and in the largest market they do not control over 16 per cent. of the tonnage of that market.

In order to hold this position, they are obliged to maintain something like 300 selling offices and 900 salesmen. The expenses in the mines are increased by the necessity of maintaining an organization that can produce the limit of the mine's capacity on 24 hr. notice.

They are competing within the boundary of their own state with the nonunion States of Kentucky and West Virginia, and the union-employee States of Ohio, Pennsylvania and Illinois. Outside of their own state they are competing with Kentucky, West Virginia, Ohio, Pennsylvania, Illinois and Iowa.

The situation is such that it is impossible for them to advance their prices, and the only method left open to them to maintain their standing in the trade is to reduce their expenses, which can only be accomplished by cooperation among them.

The tentative plan which meets with their approval consists of a single selling agency, which would decrease the selling cost several cents per ton and would enable them to standardize the business; and by intelligent distribution of orders, establishing of storage facilities for fine coal—for which there is an erratic demand—they could increase the present earnings fully 10c. per ton without in any way disturbing the present price.

The representatives of the labor element of the industry

have repeatedly urged such a movement in public investigations of conditions by several of the states.

The operations of the Indiana coal-producing industry are confined to about five states and do not extend over the entire country. It is a fact that two of the large companies in other states produce and market a greater amount of coal than is produced and marketed in the State of Indiana.

We do not believe that it is the intention of the law or of the Government to force an industry into bankruptcy. On the contrary, when such a condition arises, the sentiment of the people at large is, and that of the law and the Government should be, to allow the industry involved to adopt such reasonable methods as to avoid bankruptcy and to maintain its position in the commercial world.

It is with that idea in view that they have presented the situation in detail to the Federal Trade Commission, together with a plan which they propose to inaugurate to in a measure protect themselves. The position taken by the Indiana operators is that they prefer bankruptcy to a criminal prosecution for violation of the law.

PRESIDENT WILSON'S REPLY

The White House, Washington
April 26, 1915.

My dear Mr. Callbreath: I have your letter of Apr. 22. I am sincerely sorry that it was not possible for me to see your committee personally on Tuesday last.

You may be sure that I will consult with my associates here and that, if there is any possible way in which we can help in the situation which you unfold, we shall be glad to do so. Cordially and sincerely yours,

WOODROW WILSON.

Mr. J. F. Callbreath, Secretary, American Mining Congress, Washington, D. C.

Problems of an Electrically Operated Coal Mine

BY H. W. SMITH*

SYNOPSIS—An explanation of why some mines show such excessive production costs. The author ran an interesting test which indicated plainly just how great were the power losses.

The writer while connected with the commercial department of a large central station operating in West Virginia, which was organized solely for the purpose of supplying power to collieries, invariably encountered mines being supplied with electrical power from a plant

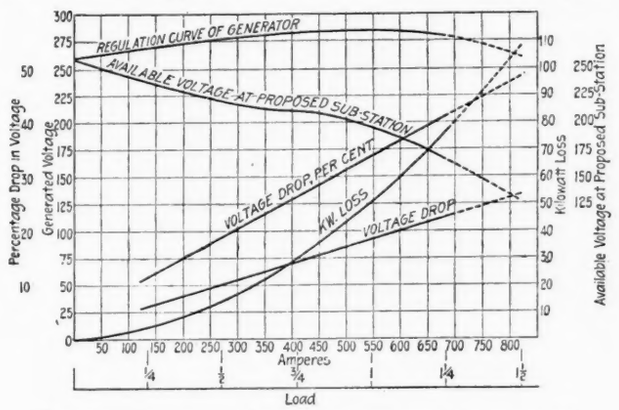


FIG. 1. SHOWING GRAPHICALLY THE RESULTS OF "SHORT-CIRCUIT" TEST

located at such a distance as to make economic operation prohibitive because of excessive line losses, thus greatly curtailing the output.

In the majority of cases conditions could be somewhat improved providing a reasonable amount of attention was given to the installation and maintenance of proper rails and bonds. But how much consideration does the average operator give this seemingly unimportant detail? What does he care so long as the wheels of his mining machines and locomotives turn and another armature does not burn out before sufficient time has elapsed to have the last one repaired. It never once occurs to him to ask, How much more coal could I run per day or what would be the annual saving in repairs for my

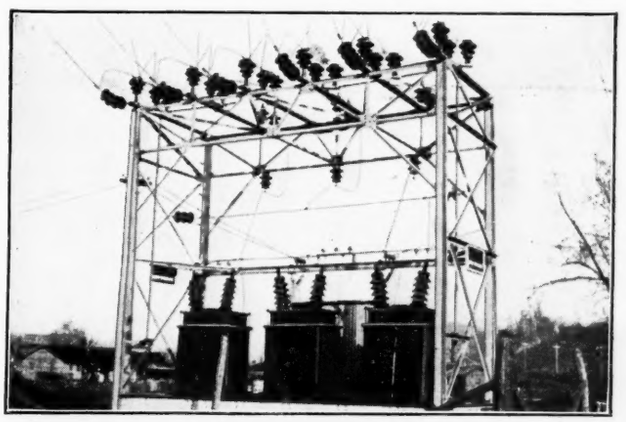


FIG. 2. TYPE OF HIGH-VOLTAGE SUBSTATION USED EXCLUSIVELY BY THE POWER COMPANY. WESTINGHOUSE OUTDOOR TRANSFORMERS ARE SHOWN

motors and coal cutters if the power back at the face was from 50 to 75 volts stronger? If he did consider such matters, we would find greatly improved conditions throughout our coal fields.

As the resistance of steel rails found in and around the average mine, providing suitable bonding is maintained, is only 12 times that of a corresponding cross-section of copper, it can be seen that the conductivity of the return should be as good if not better than the positive line, thus making it entirely unnecessary to run a copper circuit in parallel with the return, as is found in many cases.

*Engineer, Westinghouse Electric & Mfg. Co., Pittsburgh, Penn.

An Interesting Test

In order to illustrate by actual figures the losses that occur when a mine is operated from a source of power transmitted from beyond its zone of economic distribution, a description of a "short circuit" test conducted upon the power plant and transmission lines of a prospective customer is given. This test takes its name from the fact that a connection, or short circuit, is made between the feeders and return at some predetermined point on the transmission system. Low voltage is applied to the line at the point of supply and gradually increased, readings being taken of current in the line and the applied voltage, at various loads corresponding to those obtained under normal operating conditions.

The coal company selected affords a typical example of the conditions endured by the average operator.

By referring to Fig. 5 it will be seen that the positive circuit consists of two 0000 wires, one of which serves as a trolley from the drum-house to the point of

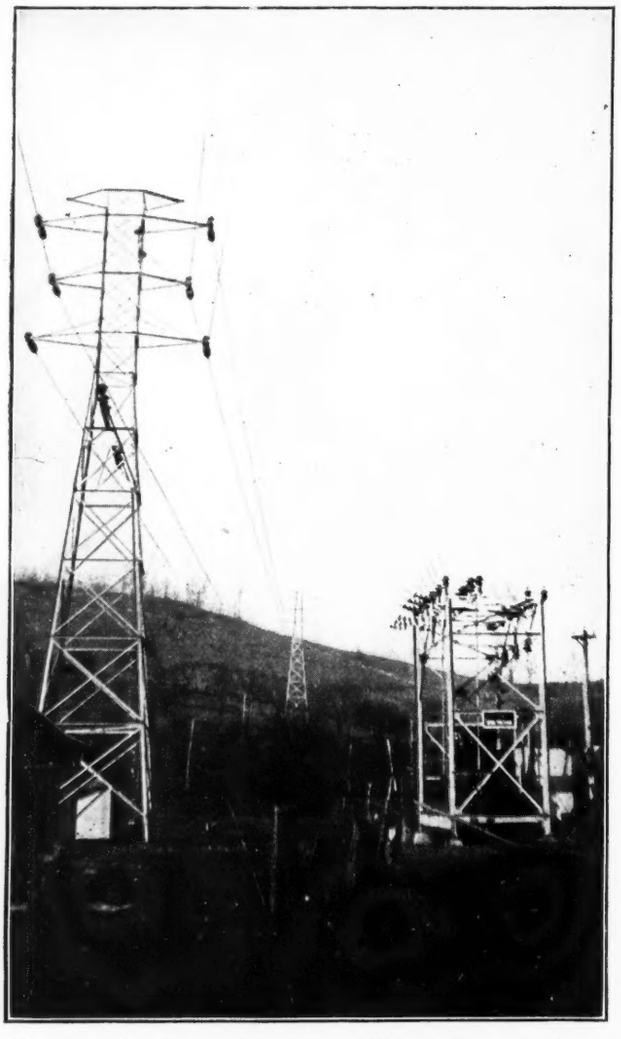


Fig. 3. Take-off Tower and High-Voltage Substation

short circuit, a distance of 2600 ft. At this point the tram and positive line divide, one running to mine "A" and the other to mine "B," the difference in elevation of the two seams being approximately 100 ft. The negative side, or "return," consists of 2600 ft. of 45-lb. rails, 1000 ft. of 30-lb. rails on an incline and 200 ft. of double 0000 copper wire extending from the end of the incline to the power house.

The generating equipment consisted of one 150-kw., 260-285-volt, 550-r.p.m. direct-current generator belted to a simple 225-hp. engine. The odd voltage is due to a set of specially wound shunt field coils, replacing a

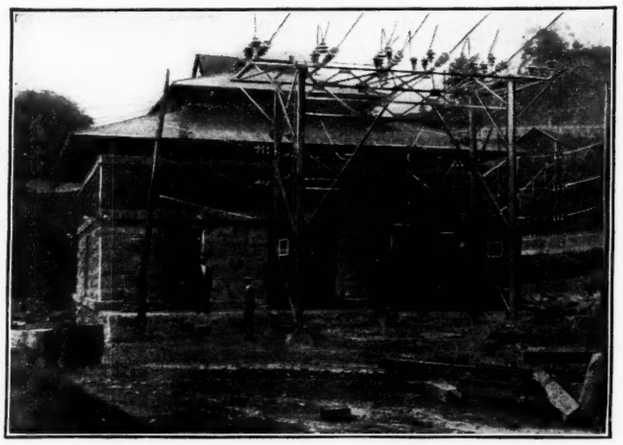


Fig. 4. Customer's Substation with Power Company's High-Voltage Outdoor Substation Adjoining

former set burnt out by maintaining a higher voltage than that for which the machine was originally designed.

In order to secure the most accurate results, all readings were taken on portable instruments located in the power house and known to be correct. By means of the field rheostat and by gradually increasing the speed of the engine, the load was slowly built up, readings being taken simultaneously upon both ammeter and voltmeter at one-quarter, one-half, three-quarters, full and one and one-quarter loads. The voltmeter reading represents the actual loss in voltage in the line when operating under normal conditions and at a corresponding load. In order to eliminate any errors due to incorrect reading of meters, all readings were carefully checked. A complete analysis of results so obtained is as follows:

RESULTS OF TEST

Load	Amp.	Voltage Drop	Percentage Voltage Drop	Kw. Loss in Trans.	Available Voltage at Proposed Substa.
¼	137	30.5	11.2	4.2	238.5
½	274	51.5	18.8	14.1	220.5
¾	411	72.0	26.6	29.5	211.0
1	546	94.0	34.0	51.3	191.0
1¼	683	112.0	40.7	76.4	167.0
1½*	820	133.0	48.5	109.0	127.0

*Calculated.

The above results are shown graphically in Fig. 1. As figures speak for themselves, it does not seem necessary to devote any space to a discussion covering the results, other than calling attention to the high losses that occur between half-load and one and one-quarter load, the limits between which a mine load is constantly fluctuating.

By again referring to the sketch, it will be seen that mine "A," with a maximum motor haulage of 3000 ft., is located at an additional distance of 875 ft., while mine "B," with a corresponding haulage of 900 ft., is located 1050 ft. from the site of the proposed substation.

This location was agreed upon as the most advantageous site for a substation by both the superintendent and

myself, after carefully considering grades, future development and local conditions. One of the principal factors covered by the so-called local conditions is the attendant, who in this case, as well as in numerous others, would be the blacksmith. The necessary attention consists of starting and stopping, pouring a little oil in the bearing about once a month and occasionally putting in the circuit breaker. By means of a simple attachment on the switchboard an electric gong is sounded upon the opening of the breaker and continues until it is closed.

Upon the completion of the test and in order to study the voltage conditions back in the mine, an offer was made to measure the voltage at different points throughout the two mines under different load conditions. To this the superintendent replied, "I know that my power is 'rotten,' but as to just how bad it is, that is something I'm better off not knowing."

One Reason for Excessive Costs

How true the above is! If conditions existed generally, as found in some mines working under similar conditions where the voltage ranges from 180 to 200 volts, on a 250-275-volt system, the decreased output and excessive costs at certain plants would be easily explained.

In order to give one an idea of the substantial line construction and high class of workmanship found

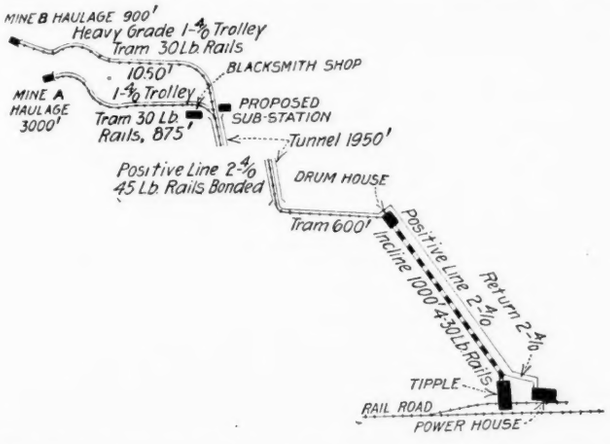


Fig. 5. Sketch Showing Location of Mines in Relation to Power House

throughout the 140 mi. of transmission lines, Figs. 2, 3 and 4 are given.

Fig. 2 shows the standard type of high-voltage, out-of-door substation used exclusively by the power company before referred to. The galvanized iron meter house can be seen in the rear. This particular substation serves two customers, power being stepped down from 44,000 to 2200 volts.

Fig. 3 shows a take-off tower, with one of the regular type in the distance, also the two overhead ground-wires. Special attention is called to the double-power circuits, the lines being so sectionalized as to permit the cutting out of sections for repairs. Immediately in the rear of the first tower will be seen one of the numerous telephone booths distributed at frequent intervals along the lines. Each patrolman is required to make his report upon arriving at a telephone. In this way the dispatcher not only receives a complete report of the entire system every four days, but keeps in constant communication with each man out on the lines.

If it were not for the electrical apparatus both inside and out, Fig. 4 could well be taken for a public building, because of its attractive appearance and tile floor, rather than a substation supplying power to a coal mine.

The power company's entire electrical equipment, including the two 10,000-kv.-a. turbo-generator sets, was furnished by the Westinghouse Electric & Mfg. Co. This is also true in regard to the greater portion of the customer's apparatus. With very few exceptions the motor-generator set was chosen by the customer in preference to the rotary converter to change his alternating current into direct, owing to its special adaptability to this particular class of service.

The Labor Situation

SYNOPSIS—In eastern Ohio a spirit to compromise on "dead work" in return for a concession on the mining rate seems about to close the long dispute between capital and labor. In Colorado John R. Lawson is convicted of the murder of a deputy sheriff.

The conference of operators and miners' representatives at Cleveland, Ohio, appeared to make some progress in the settlement of the eastern Ohio strike. Both sides appeared willing to make concessions, and the chances for settlement are the best in months.

Saturday, May 1, was occupied in discussing the width of rooms and the cost of work in slopes. Other points were the price of "dead work," rules governing the right of operators to employ and discharge workmen, the "handling" of dirty coal and the right of aggrieved employees to appeal to the grievance committee. The operators seek to include in the wage agreement a clause binding the miners to use care so as to load only clean coal.

Miners Ready to Concede Everything but the Mining Rate

In fact throughout the week no vital disagreements appeared. It seems well understood that the operators are prepared to sign an agreement giving the miners 47c. per ton for machine-mined run-of-mine coal provided the latter will make such concessions in "dead work," day labor and conservation of coal as will equalize the cost of producing coal in the eastern Ohio section with the cost in the region mining under the Pittsburgh scale. There the rate is only 44.61c. per ton for the machine-mined run-of-mine coal.

In the meantime the Gallagher amendment to the Green anti-screen law is not legally dead. Though it was defeated in the House, after being passed in the Senate, a motion was made to reconsider it, and the vote on that motion has been postponed from time to time. This keeps the amendment alive to a certain extent. Eastern Ohio operators are making a strong effort to secure the passage of the amendment, but there is not much hope that it will receive reconsideration from the House.

John R. Lawson Convicted

John R. Lawson, member of the International Executive Board of the United Mine Workers of America, was found guilty of murder in the first degree in connection with the shooting at Ludlow, Colo., of John Nimmo, a deputy sheriff. The murder occurred on Oct. 25, 1913. Lawson was sentenced to life-imprisonment at hard labor in the Colorado penitentiary. The jury had the power to order a sentence of death or life-imprisonment and apparently debated long on this choice, for the verdict was not given till May 3, whereas the jury retired to consider a verdict on May 1.

The attorneys for the defense are given 30 days to file a motion for a new trial, and Lawson is released temporarily in charge of his counsel. The murder occurred before the state constabulary had charge of the situation and while the Ludlow section house was under the command of K. E. Linderfelt. Early in the afternoon of Oct. 25, 1913, a fight occurred between the strikers and the deputies, and firing continued till the evening. During the battle Nimmo was shot through the leg and bled to death.

It is not alleged that Lawson fired the shot. He is said to have been in charge of the camp at the time and to have directed the battle. It is for those who have read the evidence to attempt to discuss the verdict, but it is clear that feeling is raised to a high degree.

The United Mine Workers' attorney, Horace N. Hawkins, declares that "Rockefeller's lawyers worked up the evidence against Lawson, and Rockefeller's detective testified in the case to secure conviction," as if such aid to the prosecution was to be condemned. If somebody had tried to loot Hawkins' house and had killed those who tried to defend it, would not Hawkins endeavor to aid the prosecution and might he not employ detectives to discover who the offenders were? Could any court refuse to consider any such relevant and competent evidence as he might present?

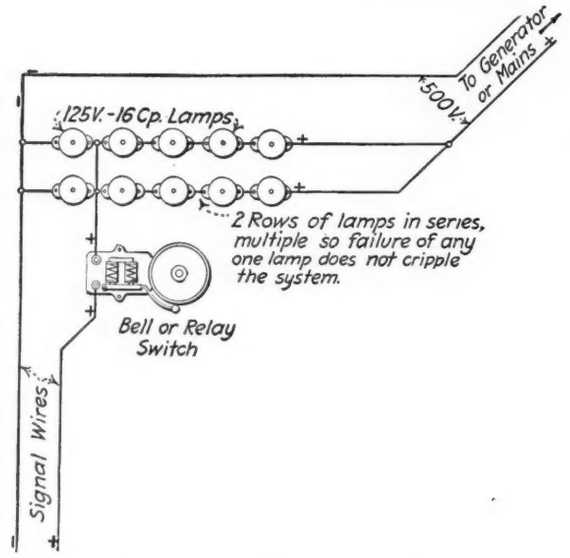
Frank P. Walsh, chairman of the Federal Commission on Industrial Relations, has made a further attack on the Rockefellers. He declares that John D. Rockefeller, Jr., is merely the mouthpiece of his father, who is really responsible for the situation in Colorado. The other charges he has made he has not seen fit to substantiate.

Signal Wires in Mines

By A. A. Le Roy*

In many of the electrically equipped mines using 250- and 500-volt direct-current for operating various machines, it is customary and practically necessary to use this voltage on signal lines, hoist roads, etc.; and where this high voltage is so carried dangerous electrical shocks may be received.

The accompanying sketch shows a method of reducing the voltage on such signal lines and of eliminating danger from shock. It consists of two parallel series of five 125-volt, 16-cp. lamps, with the signal line connecting


To Generator or Mains
500 V.
125 V.-16 Cp. Lamps
2 Rows of lamps in series, multiple so failure of any one lamp does not cripple the system.
Bell or Relay Switch
Signal Wires

Method of Reducing Voltage on Signal Lines

between the first and second lamp on the negative side of the circuit. It is important that the connection be made between the lamps on the negative side, so that where grounded systems are used the negative and ground will be of the same potential.

A Bell or Relay Is Placed in Series

In series with the line connecting between the lamps should be a bell or relay switch, which when the rapper is put across or the signal wires short-circuited causes the current to flow through the bell or relay switch to the negative side, and the lamps between the signal-line connection and negative will darken. At the same time the lamps between the signal-line connection and positive side will brighten, thus sending the current through the bell or relay switch, causing the bell to ring or, if a relay switch is used, causing it to make connection with separate signal circuit. This system reduces the voltage to 80 volts on the bell line.

In case 250-volt direct-current is used, two parallel series of three 125-volt, 16-cp. lamps should be used.

As will be noted from the sketch, the signal wires are shunted around the two lamps next to the negative side of the series. As the human body has more resistance than these two lamps, the current will flow through the lamps; and a very small amount, if any, will flow through the human body in case it comes in contact with the signal lines, thus eliminating the danger from electrical shocks.

This system is now in use in the coal mines of the Utah Fuel Co. in Utah and Colorado and has proved satisfactory.

*General master mechanic, Utah Fuel Co., Salt Lake City, Utah.

COMING MEETINGS

International Railway Fuel Association will hold its annual meeting at Chicago, May 17-20. Secretary, C. G. Hall, 922 McCormick Bldg., Chicago, Ill.

Rocky Mountain Coal Mining Institute will hold its next meeting in Trinidad, Colo., June 8, 9 and 10. Secretary, F. W. Whiteside, Denver, Colo.

West Virginia Mining Institute will hold its summer meeting at Wheeling, W. Va., June 15 and 16. Secretary, E. N. Zern, Morgantown, W. Va.

The American Society of Mechanical Engineers will hold its summer meeting at Buffalo, N. Y., June 22-25, 1915. Secretary, Calvin W. Rice, 29 W. 39th St., New York City.

The Kentucky Mining Institute will hold its summer meeting at Pineville, Ky., May 14 and 15, 1915. Secretary-treasurer, Ivan P. Tashof, Lexington, Ky.

The American Institute of Electrical Engineers will hold its annual convention June 29 to July 2, 1915, inclusive at Deer Park, Md. Headquarters will be at the Deer Park Hotel. Secretary, F. L. Hutchinson, New York.

The Illinois Mining Institute will hold its next meeting at Danville, Ill., May 27-29, 1915. The officers of the Institute are: President, J. W. Starks, Georgetown, Ill.; first vice-president, William Burton, Herrin, Ill.; second vice-president, Fred C. Pfahler, Belleville, Ill.; secretary and treasurer, Martin Bolt, Springfield, Ill.

The Coal Operators of West Virginia under the auspices of the Norfolk & Western operators, in conjunction with the U. S. Bureau of Mines and the Huntington Chamber of Commerce, will hold a state-wide first-aid and mine-rescue field meet and contest in Huntington, W. Va., May 14, 1915.

April Output of Anthracite

After three months of comparatively low production owing to the warm weather of the latter part of the winter, the output of anthracite was so large last month that the record for April shipments will probably be beaten. In April of last year shipments of anthracite were 6,072,164 tons, and the record for the month was made in April, 1910, when 6,224,396 tons were shipped.

The big increase in production is partly owing to the April discounts of 50c. a ton on the domestic sizes of anthracite and partly to the opening of the Lake trade. The unusually warm weather up to the first of April also enabled the retail dealers to allow their stock to run low so that they could take advantage of the discounts, which make a difference of over 9 per cent.

New Apparatus and Equipment

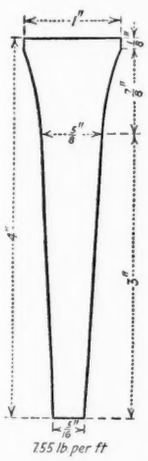
Believing that one of the greatest services that a journal such as Coal Age *can render its readers is to acquaint them with new and improved equipment which may be employed directly or indirectly to the benefit of the coal-producing industry, this department is inaugurated. For the present it will appear in the second and fourth issues of each month. We shall therefore be glad to receive from builders, manufacturers or dealers brief descriptions of new or improved pieces of apparatus in which they are interested, the use of which will tend toward better results in or the economic development of the fuel industry or any of its numerous ramifications.*

A New Heavy Screen Bar

For many years the largest screen bar in general use has been the diamond top bar, which is 2¼ in. deep; and while there were a few inquiries for larger bars, the demand was not great enough to justify the production of a larger section and manufacturers and operators at considerable expense built up bars to suit their requirements. Keen competition in the coal industry has, however, necessitated more careful preparation of coal, especially in the larger sizes, and this has resulted in a demand for a larger screen bar.

The Phillips Mine & Mill Supply Co. is now in position to furnish from stock, in maximum lengths of 18 ft. 6 in., a screen bar 4 in. deep, 1 in. wide across the top and $\frac{5}{16}$ in. thick at the bottom and weighing 7.55 lb. per ft. The accompanying drawing shows a cross-section of the bar.

This is an ideal bar for screens with wide spaces, as its depth of 4 in. allows enough of the screen bars to extend above the top of the bearers or supporting beams so that the corners of large lumps will not catch at the bearers and clog the screen. In fact, this bar has been so calculated that a spacing of 6 in. can be safely accommodated without having to make provision for additional clearance in the bearers.



Phillips Screen Bar

Another good feature is that if the notches in the bearing bars are spaced 1 in. between centers, the width of 1 in. across the top of the screen bar makes it possible to vary the spacing of the screen by inches. The new bar is interchangeable with the diamond top bar and can be used in the same notches, since the shank of the new bar has the same taper and is the same thickness at the bottom as the diamond bar.

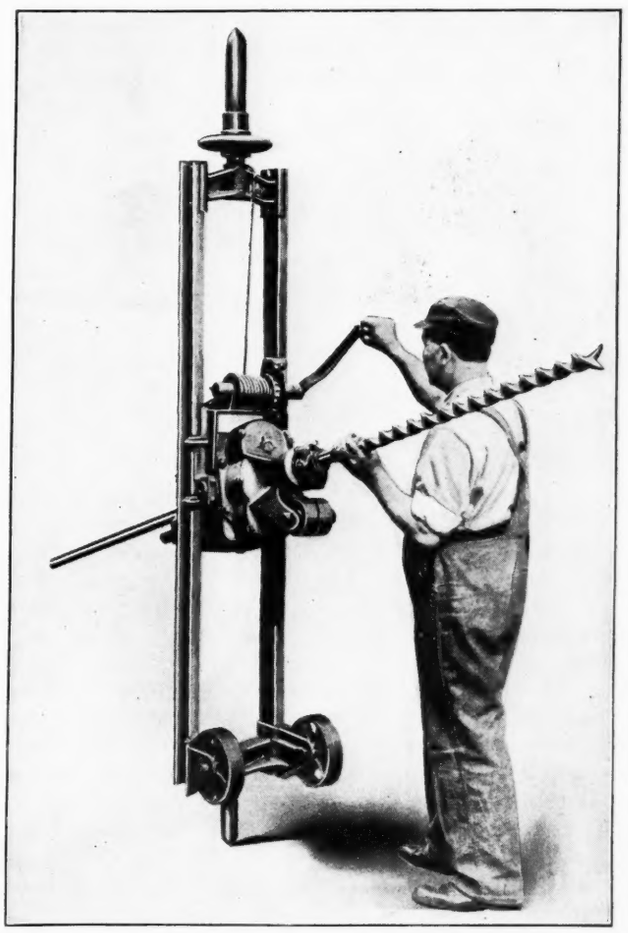
The heavy shank, as well as the shape of the head, insures the stiffness and rigidity of the bar, while the curvature from the head to the shank will enable the screenings to get away quickly and not wedge between bars.

It is believed that when this bar becomes known it will be very popular, since the need for a bar of this sort has long existed.

A New One-Man Drill

The accompanying illustration shows a new type of powerful coal drill recently developed and placed on the market by the Jeffrey Mfg. Co.

The motor and drill mechanism proper are mounted on trunnions in a carriage, which may be raised or lowered



New Type Jeffrey Drill

in a vertical channel-iron frame by means of a ⅜-in. steel rope. One end of this rope is fastened to the top yoke of the frame and the other end to a drum on the carriage. This drum is rotated by a handle, as shown, to wind up the rope and to raise the carriage. A ratchet and pawl are provided on the drum to prevent the carriage from dropping when the handle is released.

When it is desired to move the drill from one place to another, the carriage carrying the motor and mechanism is lowered to the bottom of the frame and the drill rolled

along on the wheels provided on the bottom cross-yoke, in a manner similar to an ordinary hand freight truck.

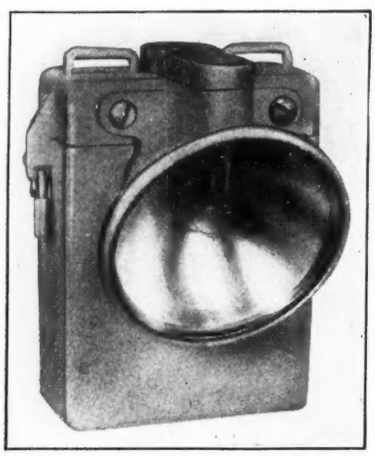
The motor of this drill is rated at 3 hp. The total weight of the drill is approximately 300 lb., while it is made sufficiently rugged and powerful to drill through any material against which the auger will stand up.

With the means employed on this drill for raising and lowering and with the wheels provided for moving it from place to place, only one man is required to move, set up, adjust and operate the machine.

The Wico Mule Lamp

It is fast being recognized that an electric lantern for mules is of equal if not greater importance than for men. The money lost through death of a mule resulting from the sudden extinguishing of a torch will pay for the cost of operation of a considerable electric equipment, and since such accidents are altogether too frequent in some mines, the electric mule lamp has received an appreciative welcome.

Electric mule lamps present a special problem in themselves. The first requisite is dependable strength. For that reason, the lamp housing of the Wico mule lamp has been made even stronger than the case which protects the battery and supports the housing. It is machined from cast aluminum with a cowl projecting far enough beyond the front glass to protect it from injury. All connections from the battery to the lamp are inclosed in aluminum so that the entire outfit presents a strong, light equipment free from fragile projections or complicated mechanism of any kind.



WICO LAMP FOR MULES

The lamp housing is attached to the cover part of the battery case, and when the battery is to be taken out for charging the cover is unlocked and unhinged from the case, disconnecting the electric circuit through strong spiral spring contacts.

It is said that mules that have worn electric lanterns refuse to budge when they are required to work without them. However that may be, no complaint has been heard of the new burden.

Influencing Employees against Unionism

BY A. L. H. STREET*

The law enacted by the Kansas Legislature in 1903, making it a misdemeanor to require an employee, as a condition to employment or retention in employment, to agree to refrain from joining, or to withdraw from, a labor union, is declared by the United States Supreme Court to be unconstitutional, in the case of Coppage vs. Kansas, 35 Supreme Court Reporter 240. As stated by Justice Day in his dissenting opinion, the importance of the decision is emphasized by the fact that statutes like the Kansas law have been passed in California, Colorado, Connecticut, Indiana, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oklahoma, Oregon, Pennsylvania, Porto Rico and Wisconsin.

Holding that the right of an employer to refuse to employ union men is a correlative of the right of labor unions to exclude from their membership men who work with nonunion employees, the Supreme Court says:

"When a man is called upon to agree not to become or remain a member of the union while working for a particular employer, he is in effect only asked to deal openly and frankly with his employer, so as not to retain the employment upon terms to which the latter is not willing to agree. And the liberty of making contracts does not include a liberty to procure employment from an unwilling employer, or without a fair understanding. Nor may the employer be foreclosed by legislation from exercising the same freedom of choice that is the right of the employee.

"To ask a man to agree, in advance, to refrain from affiliation with the union while retaining a certain position of employment is not to ask him to give up any part of his constitutional freedom. He is free to decline the employment on those terms, just as the employer may decline to offer employment on any other; for 'it takes two to make a bargain.'"

*Attorney at Law, St. Paul, Minn.

Recent Legal Decisions

Operation of New Jersey Compensation Act—The New Jersey Compensation Act does not authorize an award for death of an employee of a coal-mining company who was killed while walking along a railroad track as a trespasser, another passageway having been provided by the mining company for the employee's use. (New Jersey Supreme Court, Siemientkowski vs. Berwind-White Coal Mining Co., 98 Atlantic Reporter 909.)

Accident Resulting from Fall from Mine Roof—When suit is brought to recover for injury to, or death of, a miner caused by a portion of a mine roof falling at his place of work, it is no defense that he negligently failed to examine the roof, in the absence of any showing that an examination made with ordinary diligence would have disclosed the danger resulting in the accident. (Alabama Supreme Court, Henderson vs. Tennessee Coal, Iron & R.R. Co., 67 Southern Reporter 414.)

Duty to Warn Employee—Excessiveness of Damages—An employee at work at a coal dock, oiling hoisting appliances, is entitled to recover for injury sustained by him through starting of the machinery without notice to him, his peril being known to the employees in charge of the machinery. Eleven thousand dollars is not excessive recovery for personal injury to a man who has been able previously to earn from $60 to $90 who is permanently incapacitated for heavy work, and who sustained a compound fracture of a leg, resulting in infection and sloughing away of muscles. (Minnesota Supreme Court; Arveson vs. Boston Coal, Dock & Wharf Co.; 150 Northwestern Reporter, 727.)

Pollution of Streams in Mining Operations—A downstream dairyman through whose farm a stream runs is entitled to recover against a coal company for pollution of the stream, rendering the water unfit for domestic and agricultural purposes, caused by discharge of water from the company's coal-washing plant. (Washington Supreme Court, Packwood vs. Mendota Coal & Coke Co., 146 Pacific Reporter 163.) The court cites a decision of the West Virginia Court of Appeals wherein a coal and coke company was held liable in damages for polluting a stream by casting refuse from the company's mine and coke ovens into the river, thereby impairing the waters for the use of a farmer owning lands down stream.

Editorials

Reciprocating Engine or Turbine?

Among coal-mine operators the reliability of any piece of equipment is a consideration second in importance only to its safety. The daily tonnage produced has a direct and powerful influence on the cost sheet. Any interruption to service sends the costs per ton skyrocketing. Consequently the savings effected by the efficiency of any prime mover for a month may be totally eclipsed by the losses incurred through an hour's shutdown if such a shutdown demoralizes the organization and results in the loss of a day's output.

The reciprocating engine with simple valve gear, either the old "D" slide valve or the piston type, has met with much favor on account of its general reliability. The same has been true to a scarcely less degree of the corliss engine. This latter has heavy, slow-moving parts and takes up a considerable floor space. Its economy is good, and it possesses the ability to carry its load every day and all day without excessive attention or repair bills. This has in no small degree accounted for its popularity as a prime mover in coal-mine power plants.

All reciprocating engines are, however, open to many objections. The piston must be lubricated. For this purpose oil is introduced into the cylinder with the steam. This oil may be used once and only once, while if the exhaust is to be condensed or used in a feed-water heater the oil must be filtered out from the condensate before it goes to the boilers.

In any reciprocating engine there is a reversal of stresses upon the various parts, and an uneven torque is exerted upon the shaft. This reversal of stresses affects the piston, piston-rod crosshead, wrist-pin, connecting-rod and the bearings at each end, the crank-pin, crank and even the main shaft bearings and bearing pedestals. Thus at each revolution the piston-rod is placed first in compression, then in tension; the wrist-pin is subjected to a shearing stress, first on one side and then the other. These stresses are communicated from one link or element to another until the anchor bolts are at last reached and the earth absorbs the stresses through the foundation.

These difficulties are not due to malice aforethought on the part of the designer. On the other hand, much gray matter and many a sleepless night, to say nothing of large amounts of time and money, have been expended to avoid them or minimize their ill effects. They are, however, inherent in the idea of securing power by means of reciprocation or oscillation under the action of a fluid under pressure, and while their ill effects may be palliated, reduced, minimized they can never be wholly avoided. The fact that some reciprocating engines are at least reasonably reliable stands as a monument not to the excellence of the fundamental idea which they embody, but to the care, ingenuity and good judgment of the builder in his selection and distribution of the materials commercially available.

In marked contrast to the complicated mechanism of the ordinary steam engine is the simplicity of the steam turbine. Here there are no oscillating parts, no reversal of stresses, no internal lubrication, no uneven torque. The force of the steam is applied within a container, continuously and tangentially to the circumference of the revolving element. The torque is thus uniform; and no flywheel—which of course calls for a larger shaft and heavier bearings than would otherwise be necessary—is required.

It is unnecessary to introduce oil into the steam fed to a turbine, since the rotor does not touch the stationary element. The only lubrication necessary is that for the main bearings, and this presents only a simple problem in comparison with that of reciprocating parts. In a turbine the oil may be used, cooled, filtered and used again almost *ad infinitum*.

With customary conservativeness the coal-producing industry as a whole has shied at installing turbines in places where reciprocating engines had long been employed with reasonable dependability. Even today, after several plants have demonstrated clearly a reliability in excess of that secured with reciprocating engines, there are to be found many men who still doggedly pin their faith to the older and more complicated, although possibly the more generally understood, machine.

Coal Handling and Transportation Problems

The cost of coal on the railroad car depends largely on the expenditure of labor in handling and transporting it in and around the mine. In this country it is in the anthracite region that this cost is the highest. Undoubtedly this is partly due to the irregularity of the coal beds, to the more finical cleaning and sizing and to the closer supervision which the dangers of anthracite-mine work entail.

The purpose of this editorial is to compare the operating efficiencies in the various mining sections. In this connection it must be remembered that anthracite is always sold in its natural condition, and the number of men engaged on the outside is not increased as that of the bituminous-coal regions often is by expenditures for labor in coking or even in the saving of byproducts. These are in truth manufacturing, not mining, processes, and the men employed in them should not be considered in enumerating the men engaged in producing the coal or in considering the relative efficiency of mining methods in various parts of the country.

It must be carefully kept in mind that the outside employees in the anthracite region would make a better showing, both relative and actual, if we were to eliminate in the estimation of that and other fields the number of men engaged solely in the cleaning and sizing of coal. The anthracite region of Pennsylvania supplies statistical information in which "slate pickers" are segregated, and we are informed that under this caption are

included all employees inside the breaker, such as jig-tenders, platemen, etc. The reports from the bituminous regions of Pennsylvania, West Virginia and Illinois do not give any enumeration of workmen engaged in cleaning and sizing, though there are many men so employed, some being actually on picking tables and others trimmers on cars.

Lest too much weight should be placed on the cost of breaker work, a quotient has been obtained by dividing the whole tonnage, 91,626,964 tons, by the number of men and boys employed on the outside, excluding those working within breakers and listed as slate pickers. The divisor is thus reduced from 46,643 employees to 37,522. The quotient to which we have referred is 2442 tons per year, or 10.09 tons per day, a figure so low that it seems hard to explain. And yet in comparing this figure with the larger figures of the bituminous region, it must be borne in mind that the latter have not been "doctored" by the omission of cleaners and sizers in making the estimation.

TONNAGE PER EMPLOYEE IN PENNSYLVANIA, WEST VIRGINIA AND ILLINOIS

	Employees	Per Cent.	Tons per Employee per Year	Tons per Employee per Working Day
Penn. anthracite, 1913*:				
Miners	78,319	44.67	1136†	4.69
Other inside employees	50,348	28.72	1768†	7.31
Outside employees‡	46,643	26.61	1964§	8.12
Total	175,310	100.00	523	2.16

* All mines reporting. † Based on all tonnage except that from culm-banks. The whole tonnage was 91,626,964 in 1913, 2,619,785 being from mines and strippings, leaving 89,007,179 tons obtained from culm-banks. ‡ This includes 9121 slate pickers, men and boys, or 5.20 per cent., cleaning 10,046 tons per employee per year, or 41.51 tons per working day. § Based on the full tonnage; namely, 91,626,964 tons.

	Employees	Per Cent.	Tons per Employee per Year	Tons per Employee per Working Day
Penn. bituminous, 1913*:				
Miners	122,932	64.73	1407	5.61
Other inside employees	33,342	17.56	5188	20.67
Outside employees†	33,635	17.71	5142	20.49
Total	189,909	100.00	911‡	3.63

* All mines reporting. † This includes 10,122 coke employees, or 5.33 per cent., coking 37,381,029 tons, or 3693 tons per employee. Without these men, who are really engaged in manufacturing, there would be only 23,513 outside employees, or 12.38 per cent., the production being 7356 tons for each such employee per year, or 29.31 tons per working day. ‡ Excluding coke-workers, this figure would be 962.

	Employees	Per Cent.	Tons per Employee per Year	Tons per Employee per Working Day
West Virginia report of 1912*:				
Miners	43,581	62.60	1531	6.84
Other inside employees	13,277	19.07	5026	22.44
Outside employees†	12,758	18.33	5231	23.35
Total	69,616	100.00	959	4.28

*All mines reporting. † This includes 2297 coke employees, or 3.30 per cent., coking 3,310,250 tons, or 1441 tons per employee. Without these men there would be only 10,461 outside employees, or 15.03 per cent., the production being 6379 tons per year, or 28.48 tons per working day for each such employee.

	Employees	Per Cent.	Tons per Employee per Year	Tons per Employee per Working Day
Illinois report of 1913*:				
Miners	53,588	69.73	1129	6.31
Other inside employees	16,718	21.75	3619	20.22
Outside employees	6,549	8.52	9240	51.62
Total	76,855	100.00	787	4.40

*Shipping mines only.

But there is another vitiating principle in making comparisons to which attention must be drawn. In the anthracite region there are many strippings, and the men engaged in this work would find their appropriate classification in our tables, not as outside men, but as miners. Unfortunately, the tonnage of strippings and the men employed at such open-cut work have not been segregated in the mine reports, except in Illinois, and there the stripping work is of almost negligible importance. In the year ending June 30, 1913, about 152 men at seven strippings in Illinois mined 137,448 tons.

Another difference between anthracite and bituminous conditions makes a comparison of the work of inside men somewhat unfair. In the anthracite region there is much labor expended in reworking old breasts, especially in the Lansford district. In some cases possibly there are advantages in this work, making it more profitable than first mining, but in nearly every case second mining of this description is far more expensive than work in undisturbed coal.

Perhaps there are no sections in the Union with more efficient outside handling systems than those found in western Pennsylvania and Illinois. In the former the economy largely arises from the largeness of the operations. In the latter it finds its source possibly in the fact that the mines are mostly shafts and that the preparation of the coal is limited to careful sizing. The fact that much tramming which is outside, or tipple, work in the case of a drift is inside, or caging, work in case of a shaft, also accounts for the lower productivity of Illinois inside hands. The gain secured on the surface is a loss below.

On the other hand in western and central Pennsylvania the coal instead of being tipped by self-dumping cages is dumped on a tipple, which takes more surface hands though less men are needed below. The long haulages common to drift mines in that section are also a cause of wastage of labor, though they probably more than pay for themselves by the saving in shaft sinking and other first cost. In many cases there are long gravity planes which need the services of many men. Moreover, picking tables are somewhat numerous in central Pennsylvania.

The necessity that shotfiring in Illinois should be performed by men specially employed for that purpose increases the number of men engaged in underground work. In many cases these men are supplemented by fire hunters whose business it is to see that the shots have not ignited the coal and to extinguish an incipient blaze if such be found.

It will be noted that, excluding coke workers, the production per outside employee in the bituminous regions of Pennsylvania is 29.31 tons per day; in Illinois, where the coke ovens are away from the mines and are therefore not considered in the state report of the mining industry, the production is 51.62 tons per day for each outside workman.

The showing for this latter state (Illinois) is truly remarkable and we are informed by one of the largest operating concerns that it is not obtained by excluding men in official position from the enumeration, but represents a real economy in mine labor. Irregular operation may, and frequently does, help to increase the tonnage of coal mined per miner in any working day, but it does not give any aid to the management in increasing efficiency in other labor; for when places are vacated by the removal of workmen who become discontented at the frequent idlenesses, the transportation problems are made difficult and the outside men are often prevented from being supplied with the tonnage for which the operation was designed.

Some sections suffer from old-time regulations. In the Blossburg section of Pennsylvania, for instance, it was and perhaps still is customary to have boys at all switches, though in other regions the mule-drivers throw their own switch levers without any measurable waste of time. In many small mines overcasts are still unknown and door-

boys are employed by the dozen. In fact, sometimes a strike of the door tenders and switchboys to secure what they consider due recognition in the union or for some other reason has shut down the mines.

We have calculated the preceding figures with the idea of showing the relative efficiency of the several sections of the country. Under miners we have included in the anthracite region both miners and laborers. In the bituminous regions we have classed under that head miners, machine runners, loaders and scrapers.

It will be noticed that these figures conflict with some we published in our editorial on "Efficiency" on Mar. 27. In fact, the Pennsylvania bituminous production for 1913 was placed at 1009 per employee. Here we have it only 911, and excluding coke workers it is 962. But the reason for this discrepancy is that the figures given are from the state reports, and they are not exactly on the same basis as those from the federal sources. The definition of employee in the state reports varies much, and in West Virginia the estimate entirely excludes superintendents, mine foremen, firebosses and clerks. The federal estimate is based on all coal produced whether the mines ship coal by railroad or boat or in farm wagons. The state reports are usually entirely incomplete as to occupations in "non-shipping" mines and in some cases overlook them altogether.

It is extremely hard to tell how many men a mine has averaged in its employment during any month or year, and several men with all the facts in detail before them might make widely different reports. Thus one man might take the number of men employed in December; another might average the men on the roll during the various fortnights. A third might look further and realize that he had more men on his payroll than were working on any particular day. Some men came to the mine during the fortnight, yet did not mine coal every day during that period; others left before the fortnight was over; and the number of men on the roll might well be 5 per cent. higher than that of the men actually in the employ of the company at any one time.

Moreover, some will not work on working-days. Sometimes 50 per cent. will be idle, so that the diligent inquirer will try to ascertain how many actual workers were at the mine on each day and then he will begin to approach another problem. Many men, he will find, only sent out one car, and he will at once suspect that the man was absent and that the car filled was loaded the day before and so should be credited to that day. Or perhaps it was loaded by the man's "buddy," and it would therefore be clearly a mistake to include this man on the working force of the day.

Thus the figures of the report will depend partly on the degree of anxiety of the clerk to make a complete report and partly on his understanding or misapprehension of the information wanted. If he is seeking to know how much is produced by working men on working-days he throws out men who do not work. If he desires to make a census of the force under employment on the average working-day he includes these men until the last day or last but one on which they are credited with tonnage.

But admitting these uncertainties, we note that the inside men, other than miners, and the outside employees of the anthracite region produce barely one-third as much per man as the bituminous mines, though the miners are able to produce almost an equal amount of coal. It will be seen that the coke workers of West Virginia produce barely half as much per man as like employees in Pennsylvania. This may be owing partly to discontinuous work. But it is also due, doubtless, to the lack of Belgian or byproduct ovens and to the absence of coke drawing, quenching and loading machinery.

Lesson from the Layland Explosion

According to the coroner's verdict the deaths in the Layland mine on Mar. 17 resulted from a "blown-through" shot. John Marcunnic, a foreign miner, doubtless without the least idea of the damage he was liable to cause, drilled a hole a foot too deep into a narrow pillar of coal between two entries. As a result the powder blew a hole through the pillar instead of breaking down the coal, and it acted in a manner precisely similar to the explosions so repeatedly and clearly illustrated by the United States Bureau of Mines at the experimental mine, Bruceton, Penn.

A blown-through shot is like one which blows out; it has an equal power to raise and ignite coal dust. It is almost impossible to prevent an overestimate of the thickness of a pillar and to avoid therefore the drilling of a hole which may be so long as to constitute an element of danger. The only assurance is to keep the mine so damp or so well dusted with powdered rock that an explosion is impossible and to regard a blowout or blown-through shot not as *the* cause but as only *one* of a train of causes in a mine explosion.

Money vs. Reputation

Some men make money at a sacrifice of reputation; others increase reputation at a money expense. Moral and ethical standards condemn the former and commend the latter. If, however, we can enlarge our earnings and add to our reputation at one and the same time, it must follow that such effort is wisely expended.

Applied to yourself, Mr. Coal-Mining Man, the foregoing discourse means—write an article for COAL AGE. One man last year added $800 to his income by contributing to this paper, practically all the work being done in spare minutes. Everyone is not as adept at grinding out worth-while articles as the particular individual referred to, but any man, educated or uneducated, who has good common sense, practical experience and fair observation can get together mining facts that are of interest and value to others in the industry.

Our forewords each week have undoubtedly attracted your attention; try your hand at writing something for this display page. It may be highly technical, intensely practical or embody some helpful philosophy of a more human order. If you can get a single worthy thought across, your effort will be a success. This will net you all the way from $5 for a rough idea to $20 for a finished foreword.

Then there are a hundred other subjects directly bearing on coal mining, at least one of which will appeal to your taste and come within your experience. Study several recent copies of COAL AGE, pick your subject and get busy. Your pocketbook won't suffer, and above all, your friends will know you are still above ground.

Sociological Department

Staging Mine Fatalities at Mining Camps

The H. C. Frick Coke Co. is introducing a new feature in its campaign of education to promote safety. A meeting was held on Apr. 1 in the basement of the Presbyterian church at Leisenring No. 2, Fayette County, Penn. The purpose was to demonstrate ocularly how accidents could be avoided. After a speech by Superintendent R. K. Warnock, who presided, a demonstration was given on a raised platform showing a "fall in the drawing of pillars" being made in an improper manner. The posts were pulled and the men caught under the fall of roof. This operation was then repeated in the proper manner, the men being uninjured.

Elmer Fox gave a lecture on the use and care of the safety lamp, showing how safety lamps become defective and the danger of using such a lamp with a cracked chimney. He ended with a demonstration in which he ignited gas by manipulating a lamp carelessly.

The mine foreman, William Cowie, then showed the men the danger of not obeying the orders of the boss in the setting of posts. This was done by ordering William Brodrick to set a post in a room neck. The man failed to do so, and the rock fell, breaking his back. Ernest Dodgson then exhibited first-aid work after an accident.

Songs in both English and Slavish were sung, and the Munroe Mandolin Club gave several selections. The last number was an address by I. G. Roby, one of the state inspectors of mines.

A Whole County Takes Up Gardening

C. L. Clayton, a demonstrator of Louisville, Ky., who several years ago organized the Louisville Garden Club, has been sent by J. W. Newman, the Kentucky Commissioner of Agriculture, to Bell County, southeastern Kentucky, to direct the coal miners in the planting of 1000 gardens. Dr. J. F. Foley, who is health officer for Bell County, has been instrumental in securing Mr. Clayton's services.

These gardens range in size up to an acre apiece and are supplied by the coal operators. Lectures are being given, and films, illustrating garden work, are shown at the several motion-picture houses. Pamphlets are circulated, and the Federal Department of Agriculture has promised to send a female instructor to the county to show the wives of the miners how the surplus vegetables grown in the summer may be preserved for winter use.

It appears that large quantities of potatoes are being shipped into Bell County for the miners' consumption. These could just as well be grown in the miners' own gardens. Bell County is an active mining center, having among its large interests the Continental Coal Corporation with headquarters at Pineville.

Idle Apparatus

The anthracite operators of Pennsylvania are devoutly thankful that much rescue apparatus maintained by them at great expense remains idle. A case in point is that of the Lehigh Valley Coal Co., which equipped several fire cars for underground use in the mines over two years ago. These cars carry an electric pump which can deliver 300 gal. of water a minute, two large 30-gal. chemical extinguishers, a number of smaller-size ones, axes, buckets and complete first-aid outfits. The cars can be taken anywhere in the mines where track is laid.

At about the same time the Lehigh Valley Coal Co. elaborately equipped a railroad car for rescue work on the surface. This is fitted with operating tables, surgical instruments, lockers, water-coolers, first-aid supplies, stretchers, rubber and woolen blankets, Draeger oxygen helmets and pulmotors. It has had to be moved only once from its home station at Hazleton.

Rescue outfits are kept at central points at all the collieries in the region, and much care is expended to keep everything in working order and ready for instant use. Like the fire-fighting apparatus on a transatlantic liner, it may not be needed for a dozen years, or possibly never, but it has to be ready at all times. The prompt action of the local first-aid and rescue squads has had much to do with the lack of necessity for using these precautions.

Improved Milk Supply

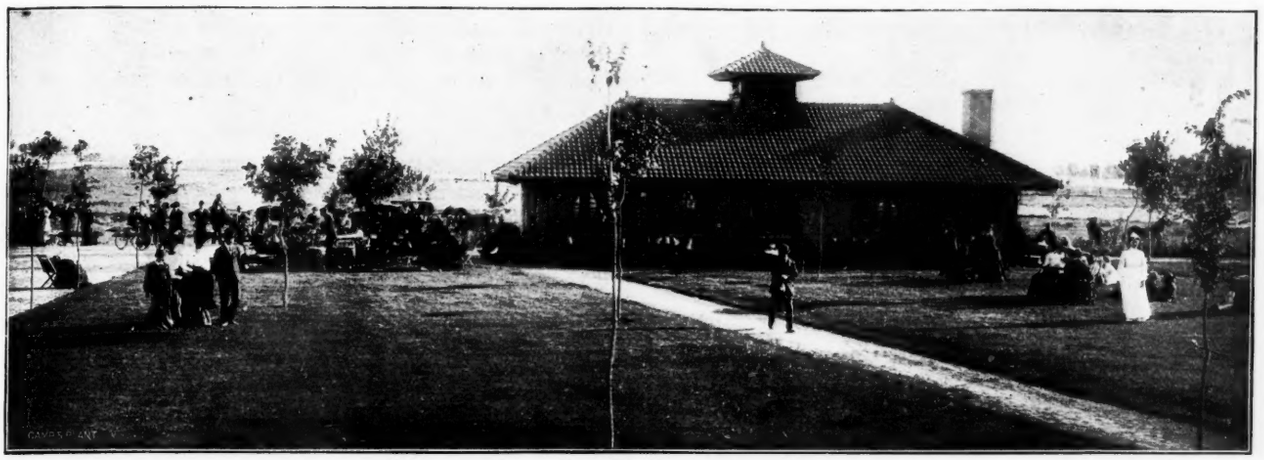
In Whitley County, southeastern Kentucky, the Stearns Coal & Lumber Co. has just purchased a thoroughbred registered Shorthorn bull of milking strain and will use him for service at the recently established mining camps. It is the purpose of the company to improve the grade of the stock owned by employees and farmers in the section.

The United States Coal & Oil Co., at Holden, Logan County, W. Va., has just completed at a cost of $6500 a model dairy barn for supplying its men with pure milk. At Colver, Ellsworth, Heilwood and Morea Colliery, all in Pennsylvania, similar institutions may be found.

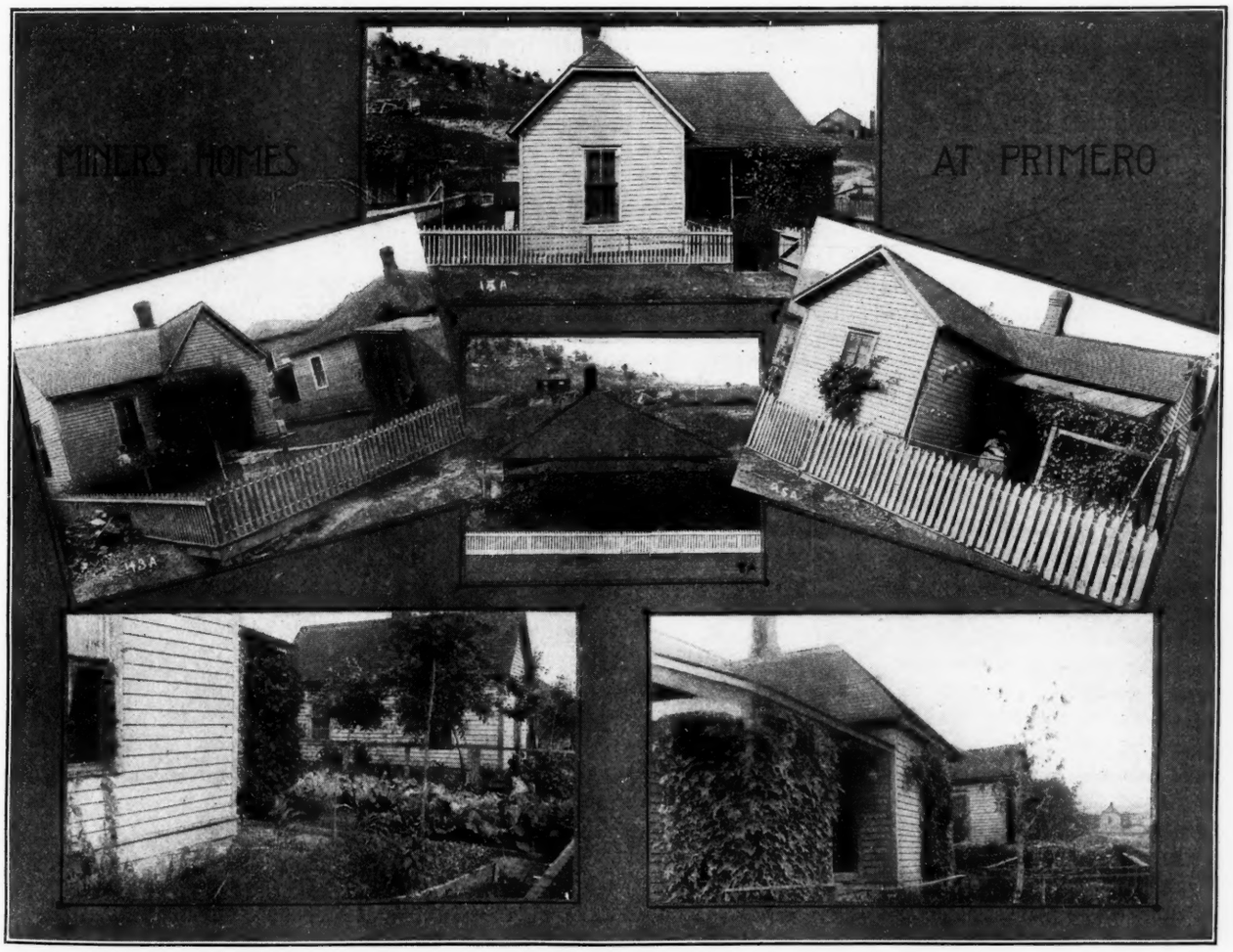
A six-team baseball league is being organized to play a summer schedule in the West Virginia-Virginia field. All salaries are to be guaranteed, and a high standard of baseball will be maintained. D. B. Sayers, chief engineer of the Stonega Coal & Coke Co., Big Stone Gap, Va., is looking for several players.

The coal operators of the Pocahontas, Tug River and Thacker districts of West Virginia, comprising what is known as the Norfolk & Western Ry. field, the Huntington, W. Va., Chamber of Commerce and the United States Bureau of Mines will hold a first-aid and mine rescue meet at Huntington, May 14, commencing at 9:30 a.m. with rescue events selected from six specified problems. In the afternoon first-aid events will be chosen out of 21 selected problems. The American Mine Safety Association and the American Red Cross will also offer prizes. The West Virginia Medical Society will be present at the meet. This will make it the more easy to secure judges. Invitations to the meet have been sent out by H. D. Smith, of Elkhorn, W. Va.

Living Conditions at the Colorado Fuel & Iron Co.'s Mines



SCENE IN THE GROUNDS OF THE C. F. & I. CO. HOSPITAL AT MINNEQUA NEAR PUEBLO, COLO., SHOWING THE LAWN, THE STEEL-WORKS BAND AND THE RECREATION HALL FOR CONVALESCENTS



PRIMERO IS A COAL-MINING VILLAGE OF THE COLORADO FUEL & IRON CO., IN THE TRINIDAD DISTRICT, LAS ANIMAS COUNTY, COLO.

Discussion By Readers

Efficiency in American Mining

I have been much interested in reading the editorial entitled "Efficiency," COAL AGE, Mar. 27, p. 547. Having had a considerable knowledge and experience of mining conditions in Europe and America, I may be qualified to comment on some of the statements made in the article to which I refer.

In the first place, I must disagree with the statement that "The foreign mine expert, on his arrival in America, travels around the mines here and in Canada and goes away saying that there is nothing to see." In some respects it is true that he is "disappointed" when he views the surface equipment of many of our mines. Our surface plants are often laid out in such a manner that the foreigner gets an impression that the topworks have been erected without a plan. In many instances, the workshops are widely separated, requiring that pieces of machinery and other material be carried from one shop to another, entailing loss of time and labor. The supply yards for timber and other material are frequently so located that the daily supply of props, cap-pieces, rails and other material required in the mine is made laborious and expensive.

When, however, the foreign visitor goes underground, his eyes open wide and he examines with increased interest the methods of transportation, wide track-gages and mine cars of large capacity. On his return he never ceases to talk about what he has seen underground in American mines and to advocate the adoption at home of many of these features. As a matter of fact, in regard to transportation both on the surface and underground, American mining is far in advance of that in other countries. Again, the output per man in American mines and American tonnage sheets never fail to attract the attention and excite the admiration of mining men from other countries who visit our mines.

However, the foreign visitor is likely to look further than this. He is much interested in the balance sheet, and here it must be acknowledged that American mining has nothing of which to be proud. Permit me to say, then, that when articles are published comparing the production of coal per man in different countries, such as that which appears on p. 548 of the issue of COAL AGE to which I have referred, it would be of interest, especially to the foreigner, to give in the same connection the dividends these operations are paying on their common stock. The comparison would help coal operators in this country to realize, to use a common phrase, that they are still "holding the baby."

A careful study of this subject has convinced me that the returns on capital invested in bituminous coal mining are smaller in America than in any other part of the world. The lesson to be learned by these reflections is that if the European mine owner can have a magnificent mine building, palatial bathhouses and offices, garden villages and parked areas, and can still pay his workmen adequate compensation for injuries, extract all his coal, observe strict and burdensome laws in respect to the mining of the coal and yet show a low fatal-accident rate while paying 10 or 20 per cent. on his common stock—surely, that is "efficiency."

I am convinced that it is the firm desire of COAL AGE to improve coal-mining conditions in this country, and if, as is true, numerous coal-mining companies here are tottering on the brink of bankruptcy owing to the ridiculously low selling prices of coal, the question that is of the first importance is, "How are conditions existing here to be improved?"

SAMUEL DEAN.

Delagua, Colo.

Improved Fireboss System

I was pleased to see that the recent discussion on "Mining Laws, Legislation and Mine Regulations" drew frequent attention to the work of the fireboss and his being obliged to cover too large a territory, making it impossible for him to complete the examination properly within the time required.

In the mine where I am employed there has been a recent change in this regard. Under the old system it was customary for the fireboss to enter the mine at 3 a.m., make his examination of the working-places and report on the outside at 6 a.m., in order not to delay the men entering the mine in the morning. The fireboss was then on hand to receive any instructions from the mine foreman and to give whatever instructions were necessary to the miners as they entered the mine for work. Having done this, he would proceed to make his second examination while the men were at work. When making his second examination he would give special attention to the safety of every working-place in the section of the mine in his charge. He would examine all falls and abandoned places and see that the ventilation, drainage, haulage roads and timbering were in good condition, so that there might be no delay in securing a regular output of coal from every place. Under this system each fireboss had from 50 to 100 men in his charge, while one or perhaps two shotfirers would be employed in each section to blast the coal and rock as required.

After much deliberation it was decided that in order to secure the greatest safety and economy of working it was necessary to change the entire system of inspection. A sufficient number of firebosses were therefore employed to divide each district of the mine and give each man the charge of only from 35 to 50 men, which was one-half the previous number, and make him perform the duties of both fireboss and shotfirer.

Under the new system the fireboss enters the mine at 4:30 a.m., examines his section of the mine, and reports outside at 6 a.m., as before. As under the old system, he still works nine hours a day, however. In his second examination he must perform the additional work of blasting the coal and rock as required, which was formerly done by the shotfirer. The new system gives general satis-

faction, the only objection made being that, with the additional work of blasting, the fireboss has little time for examining the falls and abandoned places in the mine, in such a manner as he should.

The most important feature of this system is that each section of the mine is provided with a shanty, located at about the center of the section. It is made by building two tiled walls in a cut-through. Each shanty is about 20 ft. long, 12 ft. wide and 6 ft. high, whitewashed and electrically lighted. The place is fitted with shelves and equipped with a "first-aid" outfit, stretcher, blanket and fire extinguisher, besides a full kit of tools for general work—picks, shovels, axes, hatchets, saws, hammers, jacks, wrenches, etc. These tools are given out as required and returned to the shanty at the end of each shift. The place is kept securely locked by the fireboss, who is responsible for its contents.

At the end of each shift each fireboss fills out a printed report blank showing in detail the condition of the section of the mine in his charge. These reports are given to the mine foreman, who sends them to the office. In the working of the new system it is claimed that the additional labor of shotfiring urges the fireboss to make constant endeavor to keep the coal moving. There is thus secured a more regular output and a reduction in the cost of production. In addition to his general instructions each fireboss is provided with a code of rules drawn by the management and a blueprint copy showing the ideal position of the drillholes in a working-face.

H. R. KIRKBRIDE

Curtisville, Penn.

Recognition of Bravery

Letter No. 12—I read with much interest the discussion in COAL AGE in reference to the recognition of bravery and heroic deeds performed by miners in time of mine disasters. The question has been raised as to who should be rightful competitors for such recognition, and what should be the nature of the award—whether it should be purely honorary or an attempt be made to compensate, in a measure, one who makes so generous a sacrifice without a thought of his own danger.

In Letter No. 7, COAL AGE, Mar. 27, p. 550, John H. Dye asked the pertinent question: "Should such recognition be extended to men who are performing the duties for which they are paid and which is the recognized part of their service to the government, or should it apply only to the man who has left his working-place and generously given his service without thought of pay or reward?" In my opinion, all miners and others connected with mining and all who engage in rescue work should be considered as rightful competitors.

While it is unquestionably the duty of mine inspectors and employees of the Federal Bureau of Mines engaged in rescue work to take a leading part when they are present, since they are better trained and equipped for the work, the same duty devolves upon all to render every assistance in their power to save life in time of peril. As far as the miner is concerned, it cannot be expected that his work would be as effective as that of men trained and equipped for such work, but his act would be none the less brave and heroic, and the purpose is to recognize such bravery and heroism whether it be rendered by trapper boy, miner or government employee.

In Letter No. 1, Feb. 27, p. 383, "Bykem" asks: "Should the reward be entirely honorary in all instances or conditioned to suit the rescuer's own physical condition when that is permanently impaired?" He cites the classification made by the City of Chicago in recognition of similar heroic work on the part of its employees. In that classification three grades are mentioned—commendation, honorable mention and honorable mention with medal. Geo. S. Stewart, in Letter No. 5, Mar. 20, p. 513, thinks compensation should be extended in proportion to the sacrifice made.

I cannot believe that a monetary recognition for acts of bravery would accomplish the desired end, which should be to foster in men a spirit of doing for another what one would want that other to do for him under similar conditions of danger. I believe that a monetary compensation would have a tendency to invite acts of foolhardiness on the part of would-be rescuers more than if the recognition was to be entirely honorary. In coal mining it is a recognized duty incumbent on all miners to aid, as far as possible, in rescue work when the need arises.

Those were good words of "Flat Top Engineer," in Letter No. 3, Mar. 13, p. 471, where he describes the miner in time of peril as having but "one subconscious unformulated thought that, perhaps, a human life may be saved or a human service rendered"; and I would add that every true miner feels the rendering of that service is incumbent on him. When a mine disaster has occurred and miners are entombed, ventilation destroyed, the mine liberating explosive gas and on fire, surrounded by frantic mothers and weeping children pleading for the rescue of husbands and fathers, the fellow-miner with a heart full of human sympathy and with heroic courage forgets his own danger and enters the mine with but one thought and purpose. Why speak of pecuniary reward for such a man, when his reward is in the satisfaction of having made every possible effort to save the lives of fellow-workers?

As long as coal is mined disasters must occur that will call for the voluntary service of miners that will involve danger and peril. There will be acts of bravery and heroism that will merit recognition. Let this recognition be made in a way that will stimulate self-sacrifice for others. At present I can think of no better plan than the well-earned favorable mention in the columns of COAL AGE, giving an account of the brave acts performed and the photograph of the one who sacrificed his own personal safety in the hope of saving another. This would acquaint thousands of miners with the story and inspire them with the spirit of doing for others what they would have others do for them under like conditions.

JOHN ROSE,
District Mine Inspector.

Dayton, Tenn.

Letter No. 13—The suggestion in regard to the recognition of heroism in coal mining, made in COAL AGE, Jan. 16, p. 109, was a timely one and is deserving of the most earnest consideration on the part of every man connected in any way with the coal-mining industry. Almost every other trade or calling in which hardy men engage has some sort of provision for the suitable acknowledgment of courageous acts, particularly where the object is to save life.

Probably no other calling presents the same opportunity for the display of man's noblest attributes as coal

mining, which fact is quite generally recognized. In common with most mining men, I favor the formation of a board, or commission, having for its object the careful consideration of this work in its relation to the mining of coal. The means and methods to be adopted would have to be worked out in actual practice. However, I would suggest a word or two regarding certain features that it might be well to bear in mind.

1. Care should be taken not to inaugurate a plan that would foster foolhardiness in rescue work.

2. A purely impulsive act, although heroic in its nature, should be given its rightful place; as such act naturally possesses less merit than a cool deliberate setting aside of any thought of one's own danger, in the reasonable hope of rendering assistance or saving another who is in peril.

3. The loss of life, or permanent injury by which the would-be rescuer is incapacitated for future work, would call for special consideration in any recognition accorded the act.

As is well known, the heroes of a mine are quite generally men of small income and dependent on their daily toil for the support of self and family. On this account I feel that the results to the one who makes the sacrifice and risks his own safety for that of another should receive due consideration. In this connection I may be pardoned for referring briefly to a personal experience that affords an illustration of the need of such consideration as I have mentioned.

It was at the time of the terrible Harwick disaster of Jan. 25, 1904, when 179 men lost their lives in an explosion that wrecked the mine. Cages, ropes, fans and every essential for the working of the mine were destroyed. It was before the day of the universal use of the oxygen helmet or breathing apparatus and the efficient mine-rescue organizations that have since been formed. Strong hopes were entertained by the men on the surface that some, at least, of their comrades below would be found alive and could be saved if brought out promptly to fresh air. Everything depended on prompt action, which is the case generally on such occasions. Even today, when rescue work is well organized, it frequently happens that the hope of rescue depends on the men who crowd the entrance of the mine immediately after the explosion.

In the present instance many of us in that crowd of willing volunteers had wives and families. It so happened that two of us lived very close to each other, and doubtless the same thought was uppermost in each of our minds: What would become of those at home should we lose our lives in the attempt to save those in the mine? Would the dear ones at home, as the result of our decision, have to pay the same costly price, or would a grateful government or community care for them as the soldier's widow and children are cared for today? In the full consciousness of the possible results we took the risk, but I ask in all earnestness, Would not our decision have been more easily made had this doubt that I have mentioned been removed from our minds?

What transpired that day below ground is a matter of record and need not be repeated here. Suffice it to say that my comrade, John Lyle, paid for his decision by the loss of his life, while I was spared. What might have been the terrible results to those dependent on him has often been in my thoughts, but a well-known philanthropist of the same nationality as Lyle rewarded the act of his countryman by assuming the care of his bereft family. I want to ask, Had my life been forfeited, as well it might have been but for the providence of God, what would it have availed my wife and family had they been presented with a medal and a bit of silk ribbon to console them for the loss of the breadwinner of the family?

In closing, permit me to say again that since, as almost invariably happens, the saving of the lives of those entombed in a mine by disaster depends on the prompt self-sacrificing work of those who crowd the top of the shaft immediately after the accident, any suitable recognition of the volunteer's service must consider the results to those who are bereft in the event of his death or who are left helpless if he is incapacitated for work. For the man who survives, a medal or other simple acknowledgment of his brave deed is very well and all that would be expected. But for the dependents of one whose life has been sacrificed in a reasonable attempt to save others something more practical should be devised. I believe that the suggestion made in COAL AGE will yet take more concrete form and that the coal industry itself will see to it that a suitable and adequate provision is made to meet this exigency.

SIM. C. REYNOLDS.

Houston, Penn.

Mining Laws and Legislation

Letter No. 2—One of the most interesting and important points brought out in the recent discussion of mining laws was that referred to in Letter No. 41, COAL AGE, Apr. 3, p. 613, and Letter No. 42, Apr. 10, p. 650, regarding the danger of working in a gaseous mine as compared with that in a mine having a bad roof.

Special emphasis was laid on the need of more frequent inspection in mines worked under a bad roof. Such frequent inspection is required by law in all gaseous mines, but is practically ignored in most mining laws, in respect to bad-roof conditions. Mr. Hogarth, in Letter No. 41, draws attention to the larger number of accidents that occur from falls of roof and coal than those due to the explosion of gas in mines, as shown by mining statistics.

I do not wish to be understood as being opposed to the frequent and thorough inspection of mine workings, but I feel that the benefits to be derived from such frequent inspection are often overestimated by its advocates. It must be remembered that inspection alone does not remove danger. A more frequent inspection *may* have the effect of promoting a false sense of security on the part of the miner. I have drawn attention to this fact in a previous letter on "Safety Hints," COAL AGE, Apr. 3, p. 612.

The fact is well known that men working under a treacherous soapstone roof are continually on their guard, even when the roof appears safe. They realize by experience the importance of so doing. Under these conditions, a morning examination would be of no avail inasmuch as the danger is a constantly recurring one, and the watchful miner is his own best safeguard. Then, while advocating frequent inspection of mine workings, let us place equal emphasis on the necessity for stringent mining laws and legislation, in respect to such subjects as timbering, lighting and full compliance with the existing laws and mine regulations.

I have always been deeply impressed with the need of a more practical classification of coal mines. I have referred frequently to the fact that mines should be classified rather on a basis of being "nonhazardous," "hazardous" or "extrahazardous," without regard to what cause is responsible for the danger implied in such classification. The danger in any particular case may be due to the presence of gas, dust or bad-roof conditions. Such a classification would possess the decided advantage, however, that similar demands and burdens would be required in each case in proportion to the danger to be encountered in the operation of the mine.

The following citations from the Ohio mining laws (1914) may be of interest in this connection:

Sec. 952. . . . He (the mine foreman) shall examine each working-place or have it examined by his assistant at least once each alternate day that persons are or should be at work therein and oftener when, in his judgment, the circumstances require.

Sec. 953. He shall see that the working-place of each miner is kept supplied with props of approximate length, caps and other timbers necessary to securely prop the roof thereof. When he examines the working-place he shall observe the condition of the roof and timbering and instruct the workmen therein as to the proper method of timbering for the security of the roof.

These and other references in the law make the mine foreman responsible for such an inspection of each working-place as will make it safe for the men employed therein, without reference to the particular nature of the danger that may exist there.

GEORGE N. LANTZ.

New Straitsville, Ohio.

Rescue Work at Royalton, Ill.

Permit me to correct one statement made in your editorial entitled "Royalton, Ill., Rescue Work," COAL AGE, Apr. 24, p. 729. The second paragraph states, "No one was saved." This is incorrect, for the men wearing oxygen apparatus discovered a man, at about 4 o'clock in the afternoon, in room 25 off the second-north entry. He was reclining on his powder box, still alive. He was in a semidazed condition, but, on being carried to fresh air, revived sufficiently to be taken to his home and has since fully recovered.

With the exception of about five others, this man appeared to be the only man, in the area affected by the explosion, who was not instantly killed. The positions in which a few of the men were found indicated that they had not been killed by the direct force of the explosion, but had succumbed in their efforts to reach fresh air immediately after the explosion took place.

E. C. LEE.

Herrin, Ill.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Influence of Coal Dust on Explosion—The fine dust of an inflammable coal when floating in the mine air may render the air explosive in the entire **absence of explosive gas.** Under such conditions, however, the ignition and explosion will only take place when the floating dust is acted upon by a flame of considerable volume and intensity.

When a **small percentage of methane** is present, insufficient of itself to make the air explosive, the presence of the dust floating in the air is more dangerous than when no gas is present. The dust-laden air is **more easily ignited** and the force of the resulting explosion is increased in proportion to the inflammability of the mixture.

The **purity, fineness, humidity** and **inflammability** of the dust are important factors in determining the character of the explosion, since these with oxygen are the chief elements that promote the rapidity of the combustion, which is the necessary condition of any explosion.

The suspended dust **feeds the flame** of an explosion that is started in a mine, and thus serves to propagate the blast and extend what would otherwise have proved only a local explosion. This **action is cumulative** in a dry and dusty mine. The dust lying on the roads and clinging to the sides and timbers of the passageways is blown into the air by the force of the rushing wind that precedes the explosive wave, producing what has well been called a **"pioneering cloud"** of dust that is itself highly explosive.

The **weight of fine bituminous coal dust** required to render normal air explosive has been variously estimated. Tests made at the Pittsburgh Experiment Station with dust from a 200-mesh sieve showed explosion took place in a density of 32 grms. per cu.m. (0.032 oz. per cu.ft.) or, say 1 lb. of dust in 500 cu.ft. of air. The Taffanel experiments (Liévin) gave explosion in 70 grms. per cu.m. (0.07 oz. per cu.ft.) or, say 1 lb. of dust in 230 cu.ft. of air. In one instance only, explosion occurred in 23 grms. per cu.m. (0.023 oz. per cu.ft.).

It is quite evident, as experiments also show, that conditions in respect to the **purity, humidity** and particularly the **inflammability** of the dust are so variable that the question of the density of the dust cloud has only an experimental value. The size of the workings, as determining the conservation of heat and pressure, will also modify the results in the mine.

Theoretically, since the atomic weights of carbon and oxygen are 12 and 16, respectively, 1 lb. of carbon will yield

$$\frac{12 + 16}{12} = \frac{28}{12} = 2\tfrac{1}{3} \text{ lb. carbon monoxide.}$$

But, carbon monoxide measures 13.5 cu.ft. per lb., at normal temperature and pressure. Hence, $2\frac{1}{3}$ lb. of the gas or the yield of 1 lb. of coal dust would form $2\frac{1}{3} \times 13.5 = 31.5$ cu.ft. Then, since the lower inflammable limit of carbon monoxide is when the mixture of gas and air contains 8.4 per cent., **inflammation** might be expected when the dust present was 1 lb. in $31.5 \div 0.084 = 375$ cu.ft. of air. Also, the lower explosive limit of the gas being when 16.5 per cent. of gas is present, **explosion** might be expected when there was 1 lb. of dust in $31.5 \div 0.165 = 190$ cu.ft. of air.

The Coal Age Pocket Book

Inflammability of Coal Dust—The inflammation of a dust cloud in mine workings, under like conditions, depends largely on the inflammable nature of the coal. The experiments at different testing stations have demonstrated that the **volatile combustible matter** contained in coal is a fair index of its susceptibility to inflammation when held in suspension as fine dust in the air.

Experiments performed with **anthracite dust** seem to indicate that the fine dust of that coal is not capable of propagating an explosion in a mine, under ordinary mining conditions. This fact points significantly to the conclusion previously stated that the volatile combustible matter in a coal is an important index of its explosibility. It is not asserted or claimed that anthracite dust cannot be exploded under favorable conditions. However, the conditions that would cause anthracite dust floating in the air to explode are not liable to occur in ordinary mining practice.

Influence of Shale or Stone Dust—Shale or other soft rock of the coal formations have been ground to a fine powder for use in mines and, in this form, have been sprinkled on the roads in a manner to form **stone-dust zones,** or distributed on shelves hung across and overhead in the entries to form so-called **stone-dust "barriers."**

The purpose of these dust zones and barriers is to **arrest the progress** of an explosion should one occur in the mine. Their use, however, has not been attended with **unvarying success,** which is due in part to the different conditions of temperature, humidity, air space or volume of mine workings available for expansion, inflammability of the gas- and dust-laden air and the initial intensity of the explosion; also, in part to the limited extent or adequacy of the dust zone or barrier as compared with the strength developed by the explosion.

Notwithstanding the **apparent failure** of these means for preventing the spread of an explosion in a mine in many observed instances, there is no question but that finely powdered shale or stone dust blown into the path of an explosive wave by the pioneering impulse, or suspended in the air with the inflammable coal dust has a most decided effect and **reduces explosive conditions.**

The **action of incombustible dust** suspended in an otherwise explosive atmosphere to allay the explosiveness of the mixture or reduce the violence of the blast should ignition and explosion occur is **wholly physical.** The incombustible particles disseminated through a dust-laden atmosphere separate more widely the inflammable particles of coal dust and dilute the air necessary for combustion. In other words, the percentage of inflammable matter in the mixture is reduced and the **liability to inflame** diminished in the same proportion.

Also, by its **absorption of heat,** the incombustible matter lessens the heat available for ignition and decreases the heat energy developed when ignition has taken place. The action is entirely similar to that of the inert nitrogen of air depleted of its oxygen, or to the extinctive effect of carbon dioxide when present in firedamp mixtures, both of which conditions act to diminish the explosibility of gaseous mixtures.

Inquiries of General Interest

Coal Deposits of South America

Can you give me any information in regard to the coal-mining districts of South America, stating where these are located?

JOHN S. WILLIAMS.

Cumberland, B. C., Can.

The Executive Committee of the Twelfth International Geological Congress selected for its chief subject of discussion, "The Coal Resources of the World," and in response to a specially prepared circular sent to the directors of the geological surveys and mining bureaus throughout the world they received valuable reports on the coal resources in the several countries of the globe. Later a summary of these reports was published in three volumes. The following information is taken from the first of these volumes:

The coal formations of Colombia are largely Cretaceous, although there are small areas of coal-bearing rocks in the Paleozoic formation. The probable reserve is estimated at 27 billion tons of bituminous coal.

The report states that in Venezuela bituminous coal is mined on a small scale at Naricual, near Barcelona, and at Coro, 12 or 15 mi. from the seaport of La Vela. The Naricual coal area extends from the River Querecual on the south to the mountain chain of Naricual on the north. This area is estimated to contain 200,000 sq.mi. and is underlaid with several seams of coal varying from 3 to 9 ft. in thickness.

There are no coal mines in operation in Ecuador, although considerable deposits of coal have been found in several places. Samples of this coal examined in the United States and England have been pronounced of excellent quality, but the lack of transportation facilities has prevented the development of the deposits.

Coal is one of the abundant natural products of Peru, where it is found in 15 principal belts or seams, which contain a probable reserve of 1,000,000,000 tons of commercial coal. The deposits have not been developed to any extent.

Coal in thin seams is known to cover a large area in southern Brazil. These seams, however, are split by numerous partings. The coal also contains a high percentage of ash and sulphur. The measures belong to the upper Carboniferous and Triassic formations. These deposits also extend into Argentina, where the reserve is estimated at about 5,000,000 tons of bituminous coal.

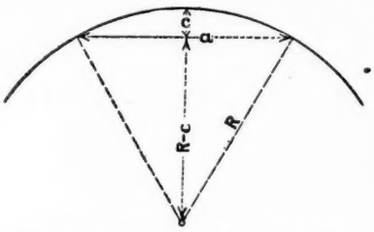
The coal seams of Bolivia are found embedded in thick strata of sandstone that resemble the millstone grit. These seams are thin, and although the coal has a fair calorific value, it contains many impurities.

Little is known of the coal deposits of Uruguay. There are no outcropping seams in this republic, although some coal has been reported recently in borings made near the northern border.

The coals of Chile probably all belong to the Tertiary, although some may be Cretaceous. In the neighborhood of Quiriquina Island there is an estimated coal area of about 60,000 sq.mi., which is largely submarine. The coal in this area is mostly lignite, the seams ranging from 1 ft. to 2 ft. 7 in. in thickness. The best coal, however, is found in the vicinity of Santa Maria Island, where three seams, aggregating a thickness of 9 ft. 9 in., underlie an area of about 700,000 sq.mi. This coal burns with a smoky flame and contains from 50 to 60 per cent. of fixed carbon, the ash varying from 2 to 11 per cent. Lignites of inferior quality occur at many points in southern Chile, while anthracitic coal of probably Mesozoic age, having a conchoidal fracture, metallic luster and burning without flame, is found at various points in the Andes.

Geometry of the Circle

Kindly publish in the inquiry department of COAL AGE the correct formula for finding the radius of a circle when the chord and the middle ordinate are given, as indicated in the accompanying figure, where a is the chord and c the middle ordinate.



CHORD AND MIDDLE ORDINATE OF CIRCLE

The formula I have, as taken from a textbook, is

$$R = \frac{c}{2} + \frac{a^2}{Bc}$$

I want to ask what is meant by Bc, which does not appear in the figure.

STUDENT.

Brier Hill, Penn.

The formula as given above is incorrect and probably contains typographical errors that make it unintelligible. The correct rule for finding the radius of the arc of a circle when the chord and the middle ordinate are given, is as follows:

RULE—*Divide the sum of the squares of the half-chord and the middle ordinate by twice the middle ordinate.*

Expressed as a formula, this rule is

$$R = \frac{(\frac{1}{2}a)^2 + c^2}{2c}$$

This formula is developed from the rule for finding the hypotenuse of a right triangle whose sides are known. In this case, the hypotenuse is the radius of the circle, and the two sides are the half-chord and the radius less the middle ordinate.

The operation is as follows:

$$R^2 = (\tfrac{1}{2}a)^2 + (R - c)^2$$
$$R^2 = (\tfrac{1}{2}a)^2 + R^2 - 2Rc + c^2$$
$$2Rc = (\tfrac{1}{2}a)^2 + c^2$$
$$R = \frac{(\frac{1}{2}a)^2 + c^2}{2c}$$

This formula is particularly useful in surveying, for calculating the required degree of curve.

Examination Questions

Miscellaneous Questions

(*Answered by Request*)

Ques.—What are the dangers incident to dry and dusty mines, and how would you guard against them? Answer fully.

Ans.—The danger that exists in a dry and dusty mine is that a possible blownout or windy shot will throw a quantity of the dust into the air. This would probably be ignited by the flame of the shot and a local explosion result. If any gas is present the danger is much increased. The fine dust thrown into the air by the ordinary operations in the mine will be suspended in the air current and the explosive condition of the mine much increased.

In order to avoid as far as possible the danger of the ignition of dust in a mine, it is necessary to avoid all accumulations of fine dust on the roadways and fine coal and slack at the working-face. It is necessary for this purpose to use dust-proof cars for hauling the coal in the mine and to load out the fine coal and slack regularly at the face. It is also necessary to establish an efficient spraying or watering system throughout the mine.

Where blasting is performed, every precaution should be taken to prevent the occurrence of a windy or blownout shot. The working-face and the sides, roof and floor should be sprinkled thoroughly before a shot is fired. All shots should be inspected, charged and fired by authorized shotfirers, who should condemn any shot that is deemed unsafe. It is important to use efficient means for the humidification of the mine air. This is best accomplished by heating the intake air previous to discharging steam into the current as it passes into the mine. This humidification of the air prevents, to a large extent, the drying out of the mine owing to the absorption of moisture by the current.

Ques.—A large percentage of mine accidents is caused by miners persisting in loading coal where the roof is unsafe. What rule would you adopt to prevent this condition and reduce the number of accidents?

Ans.—Rules are without avail unless rigidly enforced, and the enforcement of mine rules requires a close inspection and suitable penalties for any violation of the same. In order to avoid as far as possible accidents of this nature, every working place should be inspected by a competent person before the workmen are allowed to enter the mine. Every miner should also be required to examine his own roof immediately upon entering the place and before proceeding to load coal or do other work. If timber is needed he should be required to set the posts at once, and if the necessary timber is not on hand he should not be allowed to work in the place until he has secured the same and complied with the regulations. Every miner should be compelled to keep on hand two or three extra posts ready for immediate use when needed. All orders for timber should be promptly delivered at the points where they are required for use. When a room or chamber is "working," it should be closely watched, and if considered dangerous the men should be made to stay out until the roof again became quiet.

Ques.—In working a dusty mine, where marsh gas is given off and firedamp generated, what steps would you take to guard against accidents from explosions?

Ans.—The mine should be opened on the triple-entry system or the main entries should be driven four abreast. The center entry or entries should be made the main intake and the flanking entries the main-return airways for their respective sides of the mine. The mine should be divided into separate ventilation districts and should be worked exclusively with safety lamps. All accumulations of dust should be avoided. The working places and the roads and passageways should be cleaned regularly. An effective spraying system should be installed throughout the mine. Means should be adopted to humidify the intake air, which should first be heated by allowing it to pass over a system of steam pipes, so that it will absorb a larger quantity of water than would otherwise be possible.

Shotfirers should be employed to prepare and fire all shots except those that are in their opinion unsafe, and these should be condemned. Strict regulations should be enforced in regard to the use of safety lamps, and no one should be entrusted with the use of a lamp until he fully understands how it should be handled and under what conditions it is *unsafe*. At the end of each shift, all lamps should be returned to the lamphouse, where they should be cleaned, examined and put in readiness for use the next day, by a competent person in charge.

Ques.—What would be the cost of pumping 1000 gal. of water per min. to a height of 1000 ft., using a centrifugal pump driven by an electric motor, assuming the motor has an efficiency of 90 per cent. and the pump an efficiency of 72 per cent? The cost of the current is 1c. per kw.-hr.

Ans.—The first step is to calculate the size of the column pipe required for a velocity of, say 400 ft. per min., and from this find the frictional head, for the given quantity of discharge. The diameter of column pipe, for a velocity of about 400 ft. per min., is,

$$d = 0.25\sqrt{G} = 0.25\sqrt{1000} = say\ 8\ in.$$

The friction head due to a flow of 1000 gal. per min. through this pipe is

$$h_1 = \frac{flG^2}{8d^5} = \frac{0.01 \times 1000 \times 1000^2}{8 \times 8^5} = 38\ ft.$$

The actual head being 1000 ft., the total head against which this pump must operate is 1000 + 38 = 1038 ft.

Now, assuming that 1 gal. of water weighs 8⅓ lb., and taking the efficiency of the pump as 72 per cent., and that of the motor as 90 per cent., since 1 hp. = 0.746 kw., the input of the motor is

$$Kw. = \frac{1000 \times 8\frac{1}{3} \times 1038}{0.90 \times 0.72 \times 33{,}000} \times 0.746 = say\ 300\ kw.$$

At a cost of 1c. per kw.-hr., the cost, in this case, will be $3 per hr.

Coal and Coke News

Harrisburg, Penn.

Anthracite mine workers are behind the bill introduced in the Senate on Apr. 28, by Senator Beidleman, which calls for the election by the people of 21 assistant mine inspectors.

The bill provides that there shall be 5 assistant mine inspectors in Lackawanna County, 6 in Luzerne; Carbon, 1; Schuylkill, 4; Northumberland, 2; Columbia, 1; Dauphin, 1, and the counties of Susquehanna, Wayne and Sullivan, a separate district, 1.

A salary of $2000 per year is provided for each assistant. The work of the assistants would be confined entirely to seeing that the mine laws relative to ventilation are obeyed and that particular attention be paid to the circulation of air at working faces where men are employed.

If the bill becomes a law, the judges of the several Courts of Common Pleas in the anthracite region would name the first set of assistant mine inspectors. In November their successors would be elected for terms of four years. Any mine employee, aged 30, and with 10 years' actual experience in and about the mines, 5 years, at least, of which were spent in cutting coal at the face of breast, chamber, etc., would be eligible for the assistant inspectorship.

To encourage the further development of the mineral resources of the state, a bill, which is thought to be backed by the administration has been introduced by Senator McGee. The bill provides that the Secretary of Internal Affairs on application to him made to issue his warrant for not exceeding in quantity 100 acres to any one person, any coal or other minerals under the rivers of the state.

That from and after the issuing of said warrant the right to dig or mine coal, iron, limestone, etc. . . . . shall vest and be in the party in whose favor the said warrant or warrants shall issue. Provided, That he shall exercise the said right, as not in any way to interfere with the free navigation of any river or with the rights of any person or persons holding property on the banks thereof. Provided also, That nothing contained in this act shall authorize any person to undermine the bed of any river, the navigation of which has been improved by the Commonwealth, within one hundred yards from any dam or lock necessary to said improvement without the consent of the Secretary of Internal Affairs, and nothing contained in this proviso shall in any way be construed to affect any rights now vested under existing laws. And provided also, That the Commonwealth shall have the right after 20 years from this date to revoke any such warrant or grant on payment to the party, his heirs or assigns, holding the same, the original purchase money and the original costs of his works, engines, et cetera, such power of revocation only to be in force where there is any improvement made.

That the person or persons so holding said warrant or warrants, his heirs or assigns, shall and may at any time within 10 years from the date of the same have and receive a patent for the said land under the seal of the Commonwealth in the proper form granting them, their heirs and assigns, all the right, title and interest of the Commonwealth and the right to dig and mine iron, coal, limestone, sand and gravel, fire clay or any other mineral on his or their property, paying into the treasury of the Commonwealth the price of $100 per acre and the usual fees with interest from the date of said warrant subject to the restrictions contained in the 2nd section of the Act. And provided, That nothing in this Act shall prevent or be a bar to any indictment for any nuisance or injury done by any person or persons, so exercising said rights to any public or private property or for any impediment to the full and free use of any of the said rivers.

A Hearing Was Granted

The House Committee on Mines and Mining recently granted a hearing to the operators and mine workers on the Catlin Bill No. 160. Roger Devers represented the miners and James P. Torrey the operators.

Principally, the contest was on an amendment proposed by the operators to postpone the date when the bill will become effective until next January, to make it operative at the same time with the compensation bills.

Several amendments were agreed upon, one to define the term of miner, to include everybody working in the mine, another to eliminate the provision that the mine foreman must have 5 years' experience in cutting coal, and a third that legal representatives of injured families may have the right of inquisition at a coroner's inquest. The bill was referred to a sub-committee, comprising Representatives Milliron, Armstrong; West, Cambria, and Jones, Susquehanna. Two of the committee representing bituminous counties and the other a farming district.

The Anthracite Coal Tax Is Held Constitutional

Judge Kunkle, of the Dauphin County Court (sitting in Harrisburg), on Apr. 30, filed opinions upholding the constitutionality of the anthracite coal tax act of 1911, and directing judgment for the Commonwealth in the appeals of the Alden Coal Co., and Plymouth Coal Co., operating in Luzerne County and the St. Clair Coal Co., operating in Schuylkill County, from the settlement of taxes made by the Auditor General and State Treasurer. The actions involve approximately $5,000,000 in tax and it is understood that appeals to the Supreme Court will be filed within a few days.

The main opinion is in the Alden Coal Co. case, and the judge says in the course of the opinion, "We are of the opinion that the classification of anthracite coal for taxation is a legitimate one and that the taxation of such coal as distinguished from all other kinds of coal is not a violation of the constitutional provisions referred to."

The court holds that the title of the act is not defective and that it gives proper notice of what the statute contains and that the act does not contain more than one subject. While in some respects the act is declared to be crudely drawn an examination leaves no doubt of legislative intention. The court holds that the act is not local or special legislation and that it does not purport to legislate for one particular locality. Anthracite coal may be found in other counties in the future, says the court, and if the act referred to all coal the same objection might be raised to it because the coal is not found in many counties of Pennsylvania at all. The act is declared to be a statute to raise revenue for the state and does not regulate the affairs of any county or municipal division.

On the objection that it imposes double taxation because the coal companies pay a state tax on capital stock the court says the power of the Legislature to impose double taxation is "well settled."

In any event the coal might be shipped out of the state limits before the period of appraisement and the producers thus avoid payment of a double tax because if it was not owned it could not be included in property taxable for state purposes. That it would not be a uniform tax because the amount returned would relieve municipalities from some burden of taxation, by saying that the citizens will still be subject to local and state taxation and that the relief is not prohibited.

On the plea that the act is confiscatory the court says, "If the purpose for which the tax is levied is a public one there is no doubt as to the power of the Legislature to impose the tax. The statute does not present the case where the property of one is taken and applied to the use and benefit of another, but presents the case where the property is taxed by the Commonwealth and the revenues thus raised are distributed where, in the judgment of the Legislature, it seems right and proper." The court holds that the purpose of the taxation being a public one, the Legislature had the power to levy and distribute it.

The court says that it is unable to see how the act conflicts with the Federal Constitution. The coal becomes subject to tax when prepared for market or before it is started out of the state.

In passing on the last objection of the list filed the court says that if there is any valid objection to the sufficiency of the appropriation clause "its defects are open to remedy by the Legislature and without it the rest of the act can stand."

At present there is pending in the Legislature a bill to provide a new anthracite tax of 2½%, ad valorem, with requirement of an equal distribution of the tax between the state and the municipalities producing anthracite coal. The act upheld distributed 50 per cent. of the tax among counties producing the coal. The proposed act before the Legislature, specifically states that the money received by the state is to be used for highway purposes.

Conference on Compensation

Mine workers are awaiting with considerable interest the conference to be held between the Governor and 26 senators on the compensation acts now pending in the Senate. The members of the lower house are watching what the senators

do as the action of the Senate must be approved by the House.

One of the points that is disturbing some of the senators is the provision of the bill which deprives the employer of his common law defenses in case he does not choose to "voluntarily" accept the provisions of the workmen's compensation acts. The common law defense includes the "contributory negligence," "fellow servant" and similar pleas. It appears some apprehension has been manifested among operators and manufacturers in regard to this provision, and the senators have been hearing from employers "back home." A number of other points will be brought up in the conference.

It is said the Senate may not undertake to act finally on the compensation bills. Some amendments are almost certain to be made following the conference with the Governor, and this would necessitate reprinting one or more bills, which would defer the possibility of action for several days. It is even stated around the capitol that a public hearing may be held on the bill during the week of May 10, which would accord with the report that the Senate leaders are in favor of holding off final adjournment until after May 13.

PENNSYLVANIA

Anthracite

Mahanoy City—Possibly the first cash penalty since the Conciliation Board of the anthracite region was created in 1902 was decreed on Apr. 30, when ex-Judge George Gray, of Wilmington, Del., umpire of the peace body, ruled that the Lehigh Valley Coal Co. must pay Joseph Levancavage, of Buck Mountain colliery, $75 for his unjust discharge. Levancavage was dismissed by the mine foreman because he insisted he had not been paid the proper yardage. The company discovered Levancavage was right. Levancavage asked for three months' pay for the time he was idle.

Mauch Chunk—Officials of the Lehigh Coal & Navigation Co. have employed skilled woodmen to patrol Broad Mountain, between Beaver Meadow and here, in an effort to check the forest fires that threaten to devastate enormous supplies of timber.

Hazleton—John A. Moffitt, of Washington, D. C., and James A. Steese, of Harrisburg, representing, respectively, the Federal and State Departments of Labor, are to act as mediators in the settlement of the strike of the 200 stripping hands of Contractor James Duggan. The men quit some time ago because, as they claimed, a certain number of the employees were not paid in full for their work in March. The management denied the charge, and declared that all the men had received every cent due them. As neither side would yield, it was agreed to have outsiders adjust the dispute.

Sunbury—Judge Frederick B. Moser, of the Northumberland County Court, on Apr. 26 refused a new trial in the case of John Rodel, of Shamokin, who recovered $4000 damages from the Philadelphia & Reading Coal & Iron Co. for the loss of a leg which he suffered when kicked by a mule. The plaintiff alleged that without his knowledge he was given a vicious mule while at work at the North Franklin colliery, and that the mule without warning kicked with much force, throwing him over a pile of ties and under a trip of cars, which cut off his right leg. The coal company denied negligence and contended that it had no way of telling that the mule was gentle.

Ashley—Twelve hundred men and boys were thrown out of work at the Maxwell No. 20 colliery of the Lehigh & Wilkes-Barre Coal Co. on Saturday, May 1, when 100 "door boys and patchers" decided to strike in order to play baseball. The action was taken when Burgess J. K. Fenner, of the borough, notified the boys that Sunday baseball would be prohibited. The boys replied that they would keep the colliery idle every Saturday to play ball if the order is enforced. The colliery officials were unable to effect a settlement.

Nesquehoning—In one day recently 1703 loaded cars were dumped into the Lehigh Coal & Navigation Co.'s breaker here, breaking the former record of 1625 cars.

Duryea—A. B. Brown has filed suit against the Delaware, Lackawanna & Western R.R. Co. and asks damages of $2000. He charges that the coal company is pumping sulphur water from the Halstead colliery and permitting it to flow onto his land, destroying its value as a building plot.

Bituminous

Washington—Carmine Cicci has brought suit against the Diamond Coal & Coke Co., asking $8400 damages alleged to be due for the unlawful mining of coal from under his tract of land, and for surface damage incurred as a result of these mining operations. The sum of $2400 is asked for the coal removed, while the balance, or $6000, is claimed as damages to real estate and buildings.

Connellsville—Production of the Connellsville coke region is approximately 300,000 tons per week, while the demand is slowly increasing. Furnace coke is, however, standing still while the merchant business is growing steadily.

Latrobe—Marcus W. Saxman, head of the Latrobe-Connellsville Coke Co., has disposed of his holdings to capitalists allied with the Keystone Coal & Coke Co. The main offices of the firm will be moved to Greensburg. Edward Soppitt, general superintendent of the company will continue as the active field manager while the engineers and other officers will make the Latrobe offices their headquarters.

The big fan house at the Latrobe-Connellsville mine of the Latrobe-Connellsville Coal & Coke Co. located near Superior No. 2 was recently destroyed by fire entailing a loss of about $5000. A repair shop located nearby was also destroyed. It is believed that the fire originated in an over heated bearing, while the flames had gained such headway before discovery that there was no chance of saving the building. Plans for a new fan house are now being prepared, and the structure will be erected at once.

Uniontown—The Orient Coke Co. recently fired 250 ovens, this number being approximately 60 per cent. of the entire installation. It is expected that increases in the number of operating ovens will be made from time to time until full capacity is attained.

WEST VIRGINIA

Williamson—The Pond Creek Coal Co. is advertising for men, and all its mines will be run on full time shortly. This firm is one of the largest coal operators in this immediate vicinity.

Welch—The jury in the coroner's inquest held to determine how and by what means three men met death in the Davy-Pocahontas coal mine explosion a few days ago, returned a verdict that the men were killed through disobeying the mine foreman's instructions. These instructions were not to enter the mine until it had been ventilated and the fan started.

Huntington—At a recent meeting of the mines and mining committee of the local Chamber of Commerce, additional plans were agreed upon in connection with the safety and mine rescue meet to be held at League Park, May 14. Arrangements for an elaborate pageant preceding the demonstration were formulated and minor details discussed.

More than 300 men it is estimated either have already or will shortly leave Huntington and surrounding territory for Kentucky to work in the mines of the Consolidation Coal Co. It is said that over a thousand men are needed for these mines. Of the 12 mines owned by this firm on Elkhorn River, six are now running and four more will be started immediately, while the scarcity of labor is all that is preventing the opening of the remaining operations.

The West Virginia Coal Association recently perfected its organization by vesting all governing power in an executive committee of which W. D. Ord of Langraff, W. Va., is chairman, and A. H. Land, of Barbourville, secretary.

Fairmont—New orders for several hundred thousand tons of coal have been received by the Consolidation Coal Co. for delivery to the lakes as soon as possible. This means that the local firm will not only work the mines already in operation, but put other plants in commission. The new orders assure that activity in the mining industry of the Fairmont region will be better this summer than for many years in the past. The outlook is therefore bright.

Wheeling—Heretofore all shipments of coal from this section have been consigned west of Wheeling. The opening of the Lake trade a short time ago started coal moving in that direction. Recently, however, a new market has been secured on the Atlantic seaboard, and a few days ago the Baltimore & Ohio R.R. carried the first consignment of Marshall County coal to Baltimore.

KENTUCKY

Whitesburg—The Elk Horn Mining Corporation is preparing to resume its operations at Haymond after six months of idleness. More coal is said to be going out of this section over the Lexington & Eastern than ever before.

Barbourville—Second hearing of the case of Elijah Young's administrators against the North Jellico Coal Co., of Louisville, resulted in a change from the first verdict of $12,000 damages to a finding for the defendant, the second trial having been granted at the request of the plaintiff. Suit was for $25,000, Young having been killed while in the defendant's employ. He was seated on a plank between two cars, it is alleged, when the accident occurred, and the jury decided

that his death was due to his own negligence, not to that of the company.

Middlesboro—Coal operations in Middlesboro have shown more activity recently than for some time. The Wasioto & Black Mountain R.R. and the Straight Creek lines have been loading out over 300 cars a day, it is said. An extra freight train has been run on the Louisville & Nashville lately to take care of the increased business toward Corbin.

Pineville—The fourth annual meeting of the Kentucky Mining Institute will be held at Pineville, Friday and Saturday, May 14 and 15. In connection with this meeting there will be a state-wide first-aid meet. The committee in charge is endeavoring to make this meet the largest and most attractive ever held in this state and invites teams to participate. Valuable prizes have been offered, among which are included various sums in cash aggregating $100, mining lamps, wearing apparel and groceries. It is probable the American Mine Safety Association will offer medals to teams having the highest average.

OHIO

New Straitsville—The Troy mine near New Straitsville, which has been burning since the strike of 1884, has communicated the flames to the Jones Bros. mine, which started to burn last week. The Jones shaft will have to be abandoned and the property loss will be large.

Columbus—The joint resolution offered in the Ohio Senate by Senator Vorheis, empowering the Ohio Utilities Commission to investigate the question of freight rates on coal shipments in intrastate traffic, has been killed. Senator Vorheis at first desired the passage of a law regulating rates, but when it was defeated he substituted the joint resolution which met a similar fate.

Coshocton—Quite a few mines in the Coshocton field were opened last week after an idleness of more than a year. Two forces of men have been placed at work at the Warwick mine to get it in shape for operation. The three mines of the Barnes company are all in operation. Other mines are also working.

Martins Ferry—The Pittsburgh Standard Coal Co. has closed the contract for the sale of a large tract of coal with a mile of frontage along the Panhandle division of the Pennsylvania R.R. near Burgettstown, Penn. The purchasers have formed the Bertha Coal Co., while the land purchased is one of the few important tracts not worked in Washington county. It is expected that within a short time the newly organized company will close the deal.

INDIANA

Lafayette—The Chamber of Commerce has filed a protest with the Interstate Commerce Commission against the proposed increase in freight rates on shipments of Kentucky coal to Indiana points. The proposed increase is 9c. a ton. The increase does not apply to West Virginia coal, and the new rate is therefore regarded as a discrimination in favor of the West Virginia product,

Indianapolis—Notice that more than $6,000,000 due on bonds must be paid by the Dering Coal Co. or else the Indiana property of the company will be sold at auction May 21, at Terre Haute, Ind., has been filed with the clerk of the United States District Court at Indianapolis. The company has property in Sullivan, Vigo and Vermillion counties. The decree issued was entered in the suit brought by the Continental & Commercial Trust & Savings Bank of Chicago against the coal company, the plaintiff holding a mortgage securing a bond issue for $4,664,000, interest payments defaulted since Apr. 1, 1909, amounting to $1,559,294, and receiver's certificates issued amounting to $91,373.

ILLINOIS

Chicago—The first steps toward the reorganization of the Dering Coal Co., said to own the largest tract of coal land in the country, were taken May 1, when Attorney Levy Maer on behalf of the Continental & Commercial National Bank of Chicago, and Kuhn, Loeb & Co., of New York, bought stocks and bonds to the face value of $7,000,000 at auction for $681,500.

Princeton—On petition of J. H. Walsh, trustee, Judge A. Davis recently appointed Albert Whitehead, of Canton, Ill., receiver for the La Salle-Hennepin Coal Co. This is a friendly law suit to keep the affairs of the company in their present condition until a plan can be perfected to dispose of the property and pay the debt. It is considered quite possible that the mine may be reopened in the near future.

Springfield—There appears to be a well founded rumor to the effect that several thousand acres of coal land south of Springfield, located along the Chicago & Alton R.R., will be opened up during the coming summer. According to the report, a total of 6500 acres will be available during the next few months.

Lewistown—Robert Nahm is sinking a new coal shaft south of the Evans hill in East Lewistown. It is believed that this mine will be operated electrically, and that due to a favorable location it will be a financial success.

IOWA

Albia—The governor recently reappointed the following inspectors for four years beginning July 4, 1915: W. E. Holland, of Albia, first district; R. T. Rhys, Ottumwa, second district, and Edward Sweeney, of Des Moines, in the third district. At the session of the legislature just closed, a bill was passed changing the time of the biennial report from the fiscal year, June 30, to the calendar year, Dec. 31. The next report will be made for 18 months, ending Dec. 31, 1915, after which these reports will be made every two years.

COLORADO

Pueblo—The mine of the Colorado Central Coal & Mining Co., on which $300,000 in bonds is outstanding, was recently sold at auction for $15,000. The property was bid in by John H. Voorhees who represented the bondholders. The state mine inspector has refused to permit the mine to be opened until extensive repairs can be made. The company will be reorganized and funds raised to proceed with the operation.

Denver—An increase of 100,000 tons over the coal production of the state in February is shown by the March report of the state coal mine inspector's office. The total production of Colorado's coal mines for the period Jan. 1 to Apr. 1 of this year is given at 1,967,986 tons, or a decrease of 24,468 tons on the production of the corresponding period in 1914. The European war is held largely responsible for the drop in production. The March production was 678,868 tons with 11,735 men employed, while 10,580 men were employed in March, 1914. Six men were killed in the mines of the state during March.

MONTANA

Great Falls—Fire of an unknown origin recently destroyed most of the main buildings at the entrance of the coal mine of the Anaconda Copper Co., at Belt. Among these buildings were the tipple, store house, blacksmith shop, stable, and boiler house. The power house, fan house, carpenter shop and washhouse, were saved, but sustained damage. For the past two years this mine has been operated under lease by the D. W. Merkle Coal Co.

Laurel—The International Coal Co. in the Billings district is commencing the development of a new vein which promises to be one of the richest in Montana. President Talmage states that development will be rushed as fast as possible, and further announces that the coal being taken out shows as high a test as the best grades from West Virginia.

PERSONALS

M. A. Burriss, formerly connected with the Bunsen Coal Co., at Danville, Ill., has been transferred to the H. C. Frick Coke Co., with headquarters at Connellsville, Penn.

D. W. McClennan, traveling salesman for the Pittsburgh Coal Co., has been appointed sales manager of the Allegheny Coal Co., with office at Buffalo, to fill the vacancy caused by the resignation of B. W. Wistar.

James Wardlow, Sr., the mining teacher who conducted such a successful class for miners in Mt. Pleasant, Penn., last season, has reorganized his class. The class last season had 33 members, and it looks as if this year's will be much larger. Mr. Wardlow is doing a good work in this line.

A. P. Houston, of Ensley, Ala., has just received a patent on a novel type of conveyor for the joint purpose of conveying and screening coal, iron ore and like materials and to effect movement and screening of the material without excessive vibration common to present screens.

E. C. Lambert, mine inspector of the 12th District of West Virginia, has resigned. Mr. Lambert has been offered a position as superintendent of the Excelsior Pocahontas Coal Co. P. P. Kerr, assistant superintendent of the Thacker Fuel Co. of New Thacker, has been appointed successor to Mr. Lambert.

William E. Trautmann, of East St. Louis, Ill., has been named receiver for the Carterville Coal Co. This action was taken in the Federal Court, at Danville, Ill., by Judge S. M. Wright. To operate the plant involved, it will be necessary to obtain money for immediate use, either by making a loan or by issuing receiver's certificates.

W. B. Beals, who has been connected with the West Virginia-Pocahontas Coal Co. at Leckie, W. Va., for the past six years in the capacity of superintendent, has been promoted to manager of the Leckie Collieries Co., of Leckieville. William Smith, foreman of the West Virginia-Pocahontas plant, has been promoted to succeed Mr. Beals.

P. J. Rogers, for many years superintendent of the Pratt Coal Mine Division of the Tennessee Coal, Iron & R.R. Co., during most of which time convicts have been worked in some of the mines, is an applicant with strong supporters for the presidency of the State Convict Bureau. Mr. Rogers is regarded as being one of the best posted men in the state of Alabama on convict labor.

OBITUARY

Guy M. Dean, secretary of the Ohio & New River Coal Co., died in a hospital recently from the effect of a self inflicted bullet wound. Mr. Dean was a native of Owensboro, Ky., and was interested in coal operations in West Virginia and the West.

John E. Curran, 65 years old, state mine inspector of the 18th district of Pennsylvania, died in Pottsville May 1. He held the position of inspector since 1902, previous to which he was a mine foreman, having been the official head of several of the leading collieries in the vicinity of Pottsville. He started his career as a slate picker.

George W. Eliason, aged 52 years, a mine superintendent in the employ of the Byron Coal Co., died at Clarksburg, W. Va., recently from cancer. Mr. Eliason was one of the best known mine superintendents in this section of the country, having worked for a number of years for the Consolidation Coal Co., and later for the Byron Coal Co. He is survived by two sons, three daughters, two brothers and a sister.

William Johnson Eicher, 50 years old, well known in the Connellsville coke region, recently shot and killed himself, the body being discovered by Mrs. Eicher on her return from church. Mr. Eicher was an inventor and had filled numerous positions in and around the mines in the Connellsville region. Two years ago he was forced to give up the superintendency of the mines at Smithton on account of ill health. He is survived by a widow and four children.

Fred Ellwanger, sole survivor of the Marianna mine disaster of Nov. 28, 1908, died on Apr. 26 at the Washington Hospital, following several months' illness of diabetes. The deceased was aged about 46 years, and was born in Germany. Since his awful experience in the mine disaster six years ago he has not been the same man he was prior to that time. When Mr. Ellwanger was taken from the mine, more dead than alive, 42 pieces of slate and coal were extracted from his left side, where they had been blown by the explosion. His hair was burned off and a portion of one ear. The explosion occurred about 11 o'clock in the morning and it was late in the evening when he was rescued.

INDUSTRIAL NEWS

Denver, Colo.—The Denver branch office of the Sullivan Machinery Co. has been removed to Room 837, Equitable Bldg., instead of 1748 Broadway, as heretofore.

Columbus, Ohio—The offices of the Central West Coal Co. have been moved from the Columbus Savings & Trust Building to the 12th floor of the Brunson Building.

New York, N. Y.—The New York branch office of the Jeffrey Mfg. Co. has been removed from 77 Warren St., to 50 Dey St. George H. Mueller, assistant sales manager of the Jeffrey Mfg. Co., is manager of this office.

Youngstown, Ohio—Contracts totaling three million dollars for the construction of 200 by-product coke ovens at Struthers, were awarded Apr. 29 by the Youngstown Sheet & Tube Co. This firm plans extensions to cost five million dollars.

Philadelphia, Penn.—The Link-Belt Co. of Philadelphia has just received an order from the Maryland Coal Co. of Pennsylvania, St. Michaels' Penn., which is allied with the Berwind-White Coal Mining Co., for two 150-ft. centers, longwall coal conveyors.

Lewisburg, W. Va.—What is believed to be the last of the criminal prosecutions growing out of the Paint Creek coal strike was disposed of recently when L. F. Michael, a mine guard, was discharged because the state failed to presecute a charge of murder against him.

Columbus, Ohio—No bids were received for the property of the Starr-Hocking Coal Co. when it was offered for sale at public auction at the Franklin County Court House recently. The property was offered by Receiver C. E. Haskins. Authority has been secured from the court for another sale May 8.

Birmingham, Ala.—A temporary injunction was recently granted by Judge E. C. Crow of the Circuit Court to restrain T. B. Bowers, tax collector of Jefferson County, from attempting to enforce the payment by the Pratt Consolidated Coal Co. of the tax on solvent credits. It is alleged that this tax is illegal.

Havana, Ill.—J. M. Atwater is building one of the largest barges ever constructed in Havana. This boat is to be 26x60 ft., and can carry several carloads of coal or other tonnage. The side planks are of Oregon fir, 4 in. by 54 in. by 60 ft. These were shipped from Everett, Wash., on two special flat cars. This barge will be launched within a few weeks.

Fayetteville, W. Va.—The Spruce River Coal Co. operating a mine at Ramage on Little Coal River is now driving another mine on Horse Creek about 30 miles therefrom. This will be ready for operation the latter part of June. Other coal companies in the Coal River field are prospecting new mines, while others are seeking locations for expansion of their mining interests.

New Orleans, La.—A coal tipple, the only one in the New Orleans section, has been constructed at Port Chalmette, St. Bernard Parish, by the New Orleans Co. A recent test of the improvement proved it to be satisfactory in every respect. The tipple will make it possible to transfer coal from cars to barges at a greatly reduced cost. The chute is located on the lower side of Chalmette.

Trenton, N. J.—The Lehigh Coal & Navigation Co. was recently indicted in the United States Court on charges that in violation of the Interstate Commerce Act it accepted from the Central R.R. of New Jersey rebates on coal shipped from Hauto and Nesquehoning, Penn. There are thirty counts in the indictment and the defendent may be fined $20,000 on each count of which he is found guilty.

Birmingham, Ala.—It was recently announced that the steel construction for the benzol plant to be erected by the Tennessee Coal, Iron & R.R. Co. has been given to the American Bridge Co. This contract calls for several hundred tons of steel which will be made as rapidly as possible. There is a general impression that the plant will be ready for operation Sept. 1 next, and efforts in that direction will be made.

Lima, Ohio—For the first time in two years the local shops of the Cincinnati, Hamilton & Dayton R.R. Co., employing 400 men, have run on full time for an entire month, and prospects are that they will continue to do so for several months longer, as there is a large amount of equipment requiring repairs. Activity in the shops is reported to be the direct outcome of largely increased business for the road, the coal traffic to the Lakes being an important factor.

Pittsburgh, Penn—A total decrease of 1,570,893 tons of coal and coke took place in the tonnage hauled by the Pennsylvania R.R. on the lines east of Pittsburgh and Erie in March. Decreases in coke and both kinds of coal are shown for the month, as well as for the entire year thus far. The greatest falling off as compared with March, 1914, was that of bituminous coal. A total of 3,243,270 tons were hauled this year, being a decrease of 1,170,645 tons.

Washington, D. C.—The Interstate Commerce Commission recently entered a decision upon a rehearing of the petition of the Campbells Creek Coal Co., of West Virginia, holding that through rates and joint rates should be established for the transportation of coal from points on the line of the Campbells Creek R.R. to the interstate destinations mentioned in Kanawha & Michigan Ry. tariffs, and such joint rates should not exceed the main line or district rates now applied from points on the line to the Coal & Coke and the Kanawha & West Virginia railroads to the same destinations.

Baltimore, Md.—Approximately 197,794 tons of coal were exported from this port during the month of April. This exceeds the shipment during the banner month of September, 1914, when 128,761 tons were exported. Forty steamers and four schooners cleared this port foreign during the month of April. The value of the coal carried will probably reach $500,000. The exports were apportioned to the following countries in the quantities named: Italy 98,135 tons, Argentina, 55,997; Cuba, 15,401; Egypt, 8270; France, 7572; Costa Rica, 3528; Panama, 3145; Jamaica, 905; Venezuela, 950; Bahama, 80 tons.

Coal Trade Reviews

General Review

Anthracite buyers less responsive as the season advances and some accumulations are noted. Heavy increase in export shipments creates a better tone in the Eastern bituminous market. Situation at interior points continues dull and discouraging. Pessimistic outlook in the Lake trade.

The general tone of the anthracite market continues satisfactory and a large tonnage is moving, but it is nevertheless a fact that the trade is notably lacking in the usual rush that marks the opening period. There are instances where wholesalers are being hard pushed temporarily to place coal, while reports of concessions on the regular circular are noted on certain sizes. Dealers are cautious about accumulating excessive stocks and the trade is generally in a less receptive condition than at the opening period. Lake shipping is getting under way but the movement is light.

The heavy export shipments of bituminous have created a distinctly better feeling in the Eastern market. Operators are apparently so confident of a tremendous demand in this direction that they are notably less responsive to offers at the prevailing low prices and there is an optimistic trend to the situation though without any actual development of a constructive nature yet. The Atlantic Coast terminals are crowded with train loads of coal and with foreign transports.

The outlook for the late fall is much improved though consumers who have not yet covered their requirements continue buying in the open market as a rule; on the other hand it is probable they are already facing higher contract prices than could have been done the last two or three weeks. In fact were there any life to the prompt market at the moment the activity in export business would be sufficient to create a general upturn throughout the trade.

While a few agencies in the Pittsburgh district express very positive views of an improvement, it is clear that the exceedingly light shipments in the Lake trade continue to exert a very depressing influence. Operations are still heavily curtailed, in spite of which there is considerable coal on demurrage and the very cautious buyers are still relying on cheap fuel of this kind. The tonnage now moving in the Lake trade is practically negligible and there are scarcely any inquiries for the future.

The Ohio trade is still marking time pending further developments. It is reported that interior movement from the Upper Lake docks is congested, which will no doubt tend to delay any improvement at this end. The steam demand fails to show any improvement and the buyers are confining their purchases generally to the open market.

The Middle Western mining operations are restricted to an abnormally low basis, while the trade is distinctly dull and shows no indications of any change in either direction. Mine operations have been reduced to the minimum summer schedule, a great number having closed down entirely for repairs. The most encouraging factor in the current situation is a well defined tendency in all directions to maintain prices. The scarcity of screenings still prevails and this is the only grade in any active demand at all.

BUSINESS OPINIONS

Sentiment continues highly optimistic, but there are still restraining influences and unfavorable factors to be overcome.

Financial Chronicle—Definite or tangible evidence of benefits from war orders is as yet entirely lacking. In the meantime, unpleasant reminders are all the time coming to hand, making it plain that before the war orders appeared as a factor in affairs many properties were doing very poorly indeed and had uncommonly unsatisfactory income statements.

Boston News Bureau—The average business man as well as the industrial leader is convinced that business is well on the upgrade and that the second half-year will prove even more encouraging than the past quarter. Certainly the prospects of nearly all industries are uniformly brighter than at any time since 1909. New England, afflicted with tariff and railroad troubles, and for a long time a sore spot on the industrial body, is operating its cotton mills at 85% to 90% capacity, its woolen mills overtime and its machine tool factories at greater capacity than for many years.

Dun's—Each week strengthens confidence in a progressive revival of business activity, but the forward movement is, in many departments of trade, so slow, and there are so many cross influences at work, that some disappointment is felt that the advance is, on the whole, not more pronounced. That substantial progress is being made is clearly disclosed by the trade statistics and reports. Bank clearings are beginning to reveal small gains over last year, and while this favorable showing is a reflection largely of the effect of the recent speculative expansion upon the New York clearings, it is nevertheless an indication of the trend of business.

Bradstreet's—Business continues to gain in vitality, the rate of improvement being of the gradual but steadily spreading type, with trades and sections heretofore backward falling in line. Distributive trade, benefited by summer-like weather, has expanded; current shipments by jobbers of essential staples are quite satisfactory; confidence in the future, expressed at numerous points, is manifested in a strong disposition to place conservative orders for future delivery.

Iron and Steel—Pig iron buying has been light and no large transactions are recorded for finished products. The inquiry of the Pennsylvania R.R. for a large amount of equipment has not progressed any further than the tentative stages, and it seems as though this was more or less of a feeler. At the same time, it cannot be said that the market has moved backward, as operations of the leading interests are about at 70% normal. It has been denied, from authoritative quarters, that the United States Steel Corporation has any war orders and it is not believed that it will take any.

Engineering News—Every indication points to a period of prosperity for this country, the like of which has never been seen. Increased business is slowly being built on the foundation of unusual returns to agricultural interests. The self-denial of the last few months, following a period of personal retrenchment over a number of years, has resulted in the accumulation of a vast fund which is now awaiting investment. A large part of the increased business is due to the unbounded confidence of men of large affairs who are willing to risk their time and capital in new enterprises. The Construction News Department last week published more items of new construction than ever before in the history of the paper.

ATLANTIC SEABOARD

BOSTON

F.o.b. situation improved but New England trade still slack. Buyers as a rule not yet attracted but some sales are reported. Georges Creek bottoms loading Pocahontas and New River coal. Pennsylvania interests following the Eastern market closely. April prices being carried over on May shipments of anthracite in some quarters.

Bituminous—While there is no change in the demand for coal in New England, it is plain that price conditions at Hampton Roads are somewhat improved. There is enough faith in the export trade to make shippers less responsive to low offers, and minimum prices are up at least 5c. from a week ago. Manufacturing interests report a slight improvement also and it is possible we shall have much better fall conditions than have been looked for hitherto. A few new contracts have been closed lately but nothing over 25,000 tons is reported. Such tonnages are almost invariably placed with the shippers who had them last year. The consumers who did not contract early are for the most part keeping out of the market.

It is conceded there is a more optimistic feeling in the trade. The fact that Baltimore shippers have been obliged to put some of their coastwise transportation in for Hampton Roads loading is looked upon as significant. It not only increases New England clearances from Hampton Roads, but indicates at least the possibility, of diminished shipments here from Baltimore. Since a large tonnage has always come to this territory from the upper Chesapeake, the Hampton Roads agencies are naturally hopeful over the outlook.

The continued steamer congestion at Baltimore has the effect here of very much curtailing receipts of Georges Creek. If there were more life to the local market such a condition would have an effect on prices. As it is, stocks everywhere being so large, a cessation of shipments for a week or ten days would be hardly noticed.

The trade in the Pennsylvania grades continues without much change. A better movement is noticed from New York to Providence, and it is likely that 40c. freights are helping out Cambria and Somerset coals in competition with Pocahontas and New River. The export demand for Georges Creek is tending also to increase the outlet for the more popular coals from Pennsylvania. From Philadelphia there has been a slight increase in shipments of these grades and factors there are likely to make a determined effort to place coal in new directions as the season advances.

Water Freights are still easy, the supply of barges and steamers being ample to meet current demands. There is more of a disposition now on the part of owners to make charters through the season, a few such arrangements having been put through within a week. Single trip rates remain at 75@80c., depending on the class of tonnage.

Anthracite—Many of the shippers are not only carrying over a fair supply of May orders but apparently deliveries on the April schedule are being extended. There is no snap to the trade and every wholesaler is pushing hard to place coal. Once the dealers take on what their storage will accommodate it will be several months before the market develops anything more than a hand-to-mouth demand.

Current quotations on bituminous are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.85@1.40	$1.15@1.60	$1.67@1.77	
Philadelphia*.....	2.10@2.65	2.40@2.85	2.92@3.02	
New York*.....	2.40@2.95	2.70@3.15	3.22@3.32	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	... .	$2.70@2.80
Boston†.....	.....	.....	.....	3.50@3.73
Providence†.....	.....	.....	.....	3.53@3.73

* F.o.b. †On cars.

NEW YORK

More optimistic feeling in bituminous. Operators less aggressive over new business. Satisfactory situation in anthracite. Steam coals showing a tendency to drag.

Bituminous—The soft-coal market is in a healthier condition than a week ago. A stronger feeling of optimism prevails and the prospects for a rejuvenated market become more evident daily. There is plenty of coal on hand to meet any immediate demand. The low point in the bituminous market has apparently been reached and a steady progress is now anticipated. It will, however, be several weeks and perhaps months before operators will feel that conditions are what they should be.

Many large consumers who are not tied up to contracts are buying in the open market, claiming they are able to supply their wants cheaper. Very few contract inquiries are being received by the shippers. With the market becoming stronger, large consumers are likely to close contracts shortly, and in some cases it is probable they will pay more for their coal than they would have a few weeks ago. This is especially true of the higher grades. Operators are not as a rule pushing for new contracts. Some say they will not accept any new business for the coming fall and winter at the low prices that have prevailed.

Production is not being rushed, the mines working from three to four days a week and a few a trifle better. The export business is looking upward. Shipments to New England are increasing.

Local quotations on various grades are as follows:

	South Amboy	Port Reading	St. George	Upper Ports	Mine Price
Georges Creek...	$3.00@3.10	$3.00@3.10	$3.00@3.10	.....	$1.50@1.70
South Fork.....	2.90@3.05	.....	.....	.....	1.35@1.50
Clearfield:					
Best.....	2.70@2.85	2.65@2.80	.....	.....	1.40
Medium.....	2.55@2.70	2.50@2.65	.....	$2.75@2.80	1.15@1.25
Ordinary.....	2.45@2.55	2.40@2.50	.....	2.60@2.70	1.00@1.10
Broad Top Mt...	.....	.....	.....	.....	1.15@1.50
Cambria County	2.75@2.90	2.75@2.90	.....	.....	1.15@1.40
Quemahoning....	.....	2.70@2.85	2.70@2.85	.....	1.20@1.30
Latrobe.....	2.40@2.50	.....	.....	.....	0.90@1.00
Greensburg.....	2.50@2.60	.....	.....	.....	0.90@1.00
Westmoreland....	2.75@3.00	.....	.....	.....	1.15@1.25
West Virginia:					
Mine-run.....	.....	2.30@2.55	2.30@2.55	.....	0.90@1.00
Three-quarter..	.....	2.50@2.90	2.50@2.90	.....	1.00@1.10
Western Md.....	.....	2.20@2.40	2.20@2.40	.....	0.80@0.90

Anthracite—There is little to complain of in the hard-coal situation. The mines are working nearly full time; shippers are kept busy and the retail dealers are being pushed to fill all their orders. Prospects for a good summer are encouraging, although it is not expected the present pace will be maintained.

Reports from Canada and the West tell of good business and shipments on the Great Lakes are increasing. While the official tonnage figures for April are not now available it is evident from advance reports that there was a big increase in production. April business was good and the current month has opened up fair. But notwithstanding this better business some cutting of prices is being done, principally by individuals, some reports going so far as to say that shipments are being made on less than April prices.

Demand for the prepared sizes is about evenly divided. The steam coal situation remains practically unchanged. Pea coal continues in light demand with concessions being made to move tonnage. Some grades were quoted early in the week at $3. Buckwheat coals are moving slowly with little call for the poorer grades though the better qualities are finding a fair market. There is not an over-supply of the steam coals at the loading docks at present but they are beginning to accumulate.

Heavier shipments to Sound points are reported, as well as to points along the New England coast.

The anthracite market is now quotable on the following basis:

	Lower Ports		Upper Ports	
	Circular	Individual	Circular	Individual
Broken..	$4.65	$4.65	$4.70	$4.70
Egg.....	4.90	4.80@4.90	4.95	4.85@4.95
Stove.....	4.90	4.80@4.90	4.95	4.85@4.95
Chestnut	5.15	4.80@5.15	5.20	4.85@5.20
Pea.....	3.35@3.50	3.05@3.30	3.40	3.00@3.15
Buckwheat.....	2.50@2 75	2.40@2.55	2.55@2.80	2.30@2.60
Rice.....	2.00@2 25	2.00@2.10	2.05@2.30	2.05@2.15
Barley.....	1.75@2.00	1.50@1.90	1.80@2.05	1.65@1.90

PHILADELPHIA

Anthracite outlook less encouraging for May. Retail trade dull and many dealers have full stocks. Bituminous shows no indication of improvement, either in demand or prices.

Anthracite—The beginning of the month of May does not find the anthracite trade in the receptive condition that characterized it at the beginning of April. The retail trade has fallen off, and dealers are inclined to be chary about putting on additional supplies until they get rid of some of the coal they have in storage. Collections have been poor, and dealers are going slow in the matter of placing coal where they are not sure of a prompt return.

The present indications point to a dull summer, and both the wholesale and retail trade are likely to find rather hard sledding for the next three or four months. It is understood that quite a number of orders were carried over from April, and it is intimated that many of these will be filled at the April prices.

Broken size continues in good demand, mostly on contracts. Egg and stove are also holding strong, although the former size can probably be bought at less than the circular. Chestnut is developing weakness, and the inducement of stove prices is probably responsible for the moving of more than a little of this grade. All the small sizes are on the retired list for the spring and summer, and it is understood that on full mining, a large percentage of these grades will go into stock.

Tidewater prices as follows:

	Circular	Individuals
Broken.....	$4.35	$4.25
Egg.....	4.60	4.50@4.60
Stove.....	4.60	4.60
Chestnut.....	4.85	4.60@4.70

BALTIMORE

The record export movement the feature of the trade. Indications are that May will see the 200,000-ton mark passed. Domestic situation quiet and prices remain soft.

With a total of 193,293 tons of export coal recorded for the month of April, coal shippers here are looking forward to a still greater increase for the current month. All tidewater shipping terminals here are crowded with loaded coal cars and vessels, and it is expected that more than 200,000 tons will be shipped foreign from Baltimore during May. Last week more than 46,000 tons went out and there is every prospect that more than 50,000 tons will move each week of the present month.

The local situation is not favorable. While a good many of the best coals of West Virginia, Pennsylvania and Maryland are now under contract, the demand is rather slow and the spot market is still heavy.

West Virginia gas three-quarter has sold in some instances at 85@90c., but in other cases has been refused at less than $1. Slack is strong at 75c. Steam lump sells around 95c., and mine-run fuels at 80 to 85c. Best West Virginia coals sell at from $1.15 to $1.50. Pennsylvania low grade coals are offering at from 90c. to $1. High grade fuels are selling at the mines to the trade at $1.25 to $1.35. Some specialized coals of western Maryland and Pennsylvania have sold up to $1.60, but these are largely out of the open market.

HAMPTON ROADS

Movement for week shows up well. Export shipments particularly heavy. Dumpings for month of April, 1,192,020 tons.

The movement of coal in the foreign trade still continues large, the Italian ports alone having taken approximately 60,000 tons in the past week. The largest single cargo amounted to 9750 tons and went to Messina which port alone took about one-third of the coal going to Italy. The coastwise movement has been heaviest to Boston, Providence, Portland and other New England ports although some cargoes have been shipped south as far as Jacksonville, Fla. In addition to foreign and coastwise shipments considerable coal has been taken by the government for use of the Atlantic fleet.

While all of the export shipments have been Pocahontas or New River run-of-mine, some of the coal going coastwise has been nut and slack and high volatile. The demand for nut and slack appears to have improved somewhat but little inquiry is being made at present for the latter. Prices on the various grades of coal are holding up well and so far as can be learned the circular is well maintained.

During the month of April 1,192,020 tons of coal were shipped from Hampton Roads which compares with 1,063,719 tons for the same month last year. Of this quantity the Norfolk & Western moved 627,438 tons, the Chesapeake & Ohio Ry. 313,327 tons and the Virginian Ry. 251,255 tons. Both the Norfolk & Western and the Chesapeake & Ohio show a decided gain over their dumpings for the same month, last year while the figures of the Virginian Ry. are slightly less.

The following vessels sailed from Hampton Roads with cargoes of coal during the week Apr. 23 to 30, inclusive:

Norfolk	Destination	Tons
Laertis	Montevideo	5332*
Hermod	St. Thomas	4575
Albania	Brindisi	3164
Rosalia L.	Messina	9750
Aghios Gerasimos	Naples	4688
Finn	Canal Zone	6000
Antares	Vera Cruz	2700
Chiswick	Canal Zone	4800
Balgray	Genoa	5550
T. W. Dunn	Pernambuco	800
Van A. Broughton	Buenos Aires	3176
Ruth	Buenos Aires	4200
Grigorios	Civita	
Anghelatos	Vechnia	5573
Anna	Kingston	2000
H. G. Foss	Maranhan	1231
Heina	RiodeJaneiro	3949
Jas. T. Maxwell	Maranhan	840
Venus	Genoa	5629
Watermouth	Montevideo	5928
Anglo Parodi	Messina	5191
Frankrig	Barbados	2220
Italia	Messina	4327
Circe	Spezia	3875
N. M. Porcello	Bermuda	841
Benedict	Para	1250
Carlo	Cagliari	7139
Sallie C. Marvil	Pernambuco	1113
Newport News		
Corvovodo	RiodeJaneiro	3600
Knud II	Chaparra	3000
Edison Light	Havana	3868
Toiropinos	Naples	4500

*Also 200 tons of coke.

Note—Steamers are indicated by **bold face** type, all others being schooners.

Virginian Ry. dumpings for the week ended May 1 were 65,099 tons.

Dumpings of the N. & W. Ry. for the period Apr. 25 to 30 inclusive were 138,105 tons. The total dumpings for April amounted to 627,438 tons.

OCEAN FREIGHTS

Rapid increase in export shipping. Rates generally steady at former levels.

For some time past we have chartered one or two steamers per day for export coal. There is no question but that America's export coal trade is increasing very materially, and it is hoped that a large portion of this increase will be permanent. A number of coal companies here are endeavoring to develop their export business through London agents, and they may be able to sell a few cargoes in this way, but it is apparent that colliery owners here should work direct with consumers at the other end. The freight market is "marking time" to various destinations, but to South American ports the rates are easier (owing to the advancing rates on grain from the Plate) while to the Mediterranean quotations are a trifle firmer. Among the recent charters for export coal were two steamers from Virginia to Rio at $9.36; a steamer to Santos at $9.60; a steamer to Valencia, Spain, at $10.80; two steamers for West Coast of Italy at $10.80; two steamers for coke to Valparaiso or Callao; and a number of steamers for coal to Lower Plate ports at or about $9.12.

Ocean freights are now quotable on the following basis:

To	Rate	To	Rate
Havana	$2 25@2.50	Demerara	$5.50@6.00
Cardenas or Sagua	3 25@3.50	Bermuda	3.50@3.75
Cienfuegos	3 25@3.50	Vera Cruz	**3.50**
Port au Spain, Trinidad	3.75@4.00	Tampico	**3.50**
St. Lucia	3 50@3.75	Rio	**9.36**
St. Thomas	**3.25**	Montevideo	**9.06**
Barbados	3.75@4.00	Buenos Aires or La Plata	**9.12**
Kingston	3 00@3.25	Mediterranean*	**10.80**
Curacao	3.75@4.00	Spain**	9.60@10.44
Santiago	3.25@3.50	Valparaiso†	**6.72**
Guantanamo	3.25@3.50	Marseilles	9.60@10.44

Note—Rates noted in **bold face** type are only approximate.
*To a direct port not east of the West coast of Italy, Spain excluded.
†With 800 tons per day discharge.
W. W. Battie & Co.'s Coal Trade Freight Report.
**Spanish dues for account.

OCEAN CHARTERS

Coal charters have been reported by the "Journal of Commerce" as follows:

Vessel	Nationality	From	To	Tons	Rate
Colusa		Atlantic Range	Tiburon	3622	$6.50
Colusa		Atlantic Range	San Diego	5000 to 7500	7.00
Bonvilston	British	Philadelphia	River Plate	1815	9.36
Mathilde	Norwegian	Baltimore	Havana	1346	
Florence M. Belding		Philadelphia	Cienfuegos	493	
Eagle Wing		New York	Charleston	1076	
Wm. Booth		Philadelphia	Wiscasset	435	1.00
Samuel P. Bowers		Norfolk	San Juan, P.R.	526	
Maasdijk	Dutch	Atlantic Range	Rio Janeiro	2935	9.36
Bendew	British	Virginia	Valencia	2305	10.08
	Foreign	Baltimore	Virginia	6000	10.32
	Foreign	Virginia	Montevideo	5500	8.88
Ella M. Willey		Norfolk	Rio Janeiro	735	7.50
Fanny C. Bowen		Philadelphia	Mayport	892	0.95
Sophie H.	Dutch	Norfolk	River Plate	1864	9.36
Henrik Ibsen	Norwegian	Atlantic Range	Barcelona	2960	
Heighington	British	Atlantic Range	Barcelona	1827	9.12
Eliofilo	Italian	Philadelphia	Messina	2395	
Itasca		Philadelphia	New Orleans	989	
Alicia B. Crosby		Norfolk	Brazil	1016	
George E. Walcott		Norfolk	Para	1388	
Evelyn W. Hinkly		Norfolk	Azores	558	
J. Frank Seavey		Philadelphia	Summerside, P.E.I.	336	$1.85
Evanger	Norwegian	Baltimore	Nipe Bay	1326	
New Orleans		Philadelphia	New Orleans	1017	
Primus (bark)	Norwegian	Norfolk	Buenos Ayres	1019	
Dagny (bark)	Norwegian	Norfolk	Rio Janeiro	1034	
Ferm (bark)	Norwegian	Norfolk	Pernambuco	1898	

Note—Steamers are indicated by **bold face type**, all others being schooners.

LAKE MARKETS

PITTSBURGH

Mine operations continue at about 50%, with hardly any contracting. Both contract and free coal are at low prices. Poor outlook in Lake trade.

The coal trade of the Pittsburgh district has experienced little if any improvement since last report. A little Lake coal is now moving but the movement is very small indeed for the beginning of May, and there is little prospect of anything like a normal business before the beginning of July. Scarcely any merchant coal is moving to the Lake trade, or is even being inquired about, the shipments being almost entirely by regular shippers who have their own sources of supply. From the present outlook it is possible that the whole season will pass without much coal being bought for Lake shipment.

Demand from manufacturers has shown no increase in the past week, and in some quarters there is even reported a slight decrease. The domestic demand is very small. Operations in the Pittsburgh district continue at about 50% of capacity, some mines operating at less than this rate and others being closed, while a few are working at close to capacity.

Prices continue as irregular as ever. There can scarcely be said to be a contract market, though $1.15 for mine-run is usually named as the objective point. This same figure, however, represents about what has been done in occasional transactions for ¾-in. Lake coal. For prompt lots last week's quotations are repeated, the figures being subject to shading upon occasion as formerly: Slack, 75@80c.; nut and slack, 90@95c.; nut, 95c.@$1; mine-run, $1@1.05; ¾-in., $1.10@1.15; 1¼-in., $1.20@1.25, per net ton at mine, Pittsburgh district.

BUFFALO

Bituminous still quiet, but doing a little better, according to jobbers. Operators not so hopeful. Anthracite about normal.

Bituminous—The more sanguine members of the jobbing trade are positive that the demand is better than it was and though they admit that prices are about 10c. lower than a year ago, they are somewhat better than during the past month. The Canadian trade is about as dull as ever, and this injures Buffalo more than any other market could. Quite a good many shippers here depend on that trade very largely. As a rule the Canadians take the view that their factories will soon get war orders enough to keep them running. There is said to be a large amount of bituminous coal on car service; it does not appear to be in excess here, though there is always some. City jobbers are receiving letters from mine owners urging them to take coal which cannot be placed elsewhere. The general opinion is that there will be a slow increase in activity for a month or two and then something better. One difficulty is that not a few wise consumers are depending exclusively on demurrage coal and refuse to consider a purchase till it is offered to them below the regular

market. No real improvement is possible under such conditions.

There is not enough new strength to the bituminous market to make any advance in prices likely right away. Quotations continue at: $2.70 for Pittsburgh lump, $2.55 for three-quarter, $2.45 for mine-run and $2.25 for slack, with $2.50 for smokeless.

Anthracite—The trade is quiet, but there is no complaint, as sales are never heavy at this time of the year. Some of the shipping agents state that there is a shortage of coal and there is apparently a better demand for it eastward than there is to the west. Lake shipments are rather light, being 99,000 tons for the week. Some of the companies report that they are merely taking care of their small customers at the minor Lake ports, as they still have a sufficient supply at the larger centers. Locally there is some price cutting in anthracite.

TOLEDO

Some movement of Lake coal but it is still light. Prices unchanged but weak.

There are some boats loading here but not much Lake coal is yet moving nor is it expected that there will be any really heavy shipping until June or July, because of the heavy stocks at the upper docks. The unsettled condition at the Ohio mines is also affecting the situation and very little hope is expressed here of an early settlement of the labor difficulties. The domestic trade has fallen off considerably and steam coal is not moving very freely. It is still early for the summer contracts on anthracite coal although it is expected that there will be the usual demand for summer delivery within the next two or three weeks. Prices are not holding very close to the list.

COLUMBUS

Dullness still characterizes the coal trade in Ohio. Some little activity is shown in Lake business. Steam market is dull.

Some slight stir is noted in the Lake trade but the season is slow in opening. Coal men generally are still playing a waiting game, hoping for something to turn up to inject activity in the market.

Retailers are only buying what they must have to piece out the season and consequently their orders are small. Most of the dealers have cleaned up fairly well and this is taken as an indication for good business when the stocking season arrives.

Steam trade is slow in every way. Manufacturing is not increasing to any extent and as a result fuel requirements are not large. A large part of the fuel for steam purposes is being purchased in the open market at the cheap prices which prevail; as a result contracting is a difficult matter at this time. Some railroads are using considerable coal.

Lake trade is showing some activity but it will be July 1 before it is in full blast. Some cargoes have moved from the Lower Lake ports to the Northwest. The docks of the Upper Lake ports are still congested and the interior movement is rather slow. Chartering of boats is now more active. With the opening of the Lake trade there is a softening in the prices for small sizes which is usual for this period.

Production in Ohio fields is still low. In the Hocking Valley the output is estimated at but 25% of normal and the Jackson field reports about the same output. In Massillon, Cambridge and Crooksville the output is not more than 35%. Pomeroy Bend reports about 40% of the average.

Some demand for anthracite is noted and prices are down some from the winter levels.

Prices in the Ohio field are:

	Hocking Valley	Pomeroy	Kanawha
Rescreened lump	$1.45	$1.50	.....
Inch and a quarter	1.30	1.35	$1.30
Three-quarter inch	1.25	1.30	1.25
Nut	1.15	1.25	1.15
Mine-run	1.05	1.10	1.05
Nut, pea and slack	0.70	0.70	0.65
Coarse slack	0.60	0.60	0.55

CINCINNATI

Business slow, but agencies continue optimistic. Domestic trade is behind the season. Steam demand better, but prices unsatisfactory. Producing conditions are good.

Both consumers and producers are of the opinion that business is going to improve and the feeling is mildly optimistic. However, the movement remains rather sluggish. Extremely warm weather has virtually cut off the domestic demand for immediate consumption, and the usual spring movement is slow getting under way. There is a large production of screenings and prices are rather unsatisfactory, being 10 or 15c., according to grade, below normal; but the expected improvement in the industrial situation is relied upon to remedy this in the near future.

LOUISVILLE, KY.

Move to prevent price cutting. Slack still short. Some shipments to the Lakes.

The mining companies are doing what they can to prevent price cutting which is reported here and there and groups of operators are holding meetings to try to control this practice. Some Kentucky coal is going to the Lake district, especially from the Big Sandy section and there is no change in the shortage as to steam coals. Prices are quoted at from $1.40 to $1.75 for block, $1.25 for egg and 50 to 70c. for nut and slack in the eastern field; there is no nut and slack on the market in the west, all that produced being absorbed on contracts. Money is free and this is helping stocking operations somewhat.

NEW ORLEANS

Trade quiet. Stock ships for Europe taking large tonnages.

There is no change over recent depressed conditions except on the river front, where trade shows some activity owing to an unusual number of vessels in port, most of them for war cargoes. An abnormal amount of coal is being taken aboard the stock ships, as a sort of ballast. There is no domestic demand. The steam consumption is slightly better.

COKE

CONNELLSVILLE

Better tone sentimentally but quotations unchanged. Production continues at close of 300,000 tons weekly.

The coke market continues to show an improved tone sentimentally, but there has been little activity and prices are not quotably higher though there does not seem to be much coke left at minimum prices. The Pittsburgh Steel Co. is rumored to have contracted with the Rainey interests for about 20,000 tons of coke a month, from July to June at $1.95. As this interest has the contract to June 30 the rumor is generally credited. Prices on coke are on a scale up, according to the period of delivery, and are still quotable as follows: Prompt furnace, $1.55@1.60; contract furnace to June 30, $1.60@1.65; contract furnace to Dec. 31, $1.75; prompt foundry, $2@2.35; contract foundry, $2.20@2.30, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Apr. 24 at 299,493 tons, an increase of 1271 tons, and shipments at 294,995 tons, a decrease of 1349 tons.

Buffalo—There is not much improvement in the local demand, though there are reports of some stir in the Connellsville district. As a rule the trade does not credit the reports, positively as they are made by one or two leading shippers. There is an increase of iron activity here, but nothing significant can be made of it till it has continued for some time. The general feeling is better than it was. Quotations remain on the basis of $4.15 for best 72-hr. Connellsville foundry and $3.15 for stock coke.

Chicago—The market is very quiet for both furnace and foundry sizes with prices steady, but some domestic shipments have been sold at a sacrifice. Prices are as follows: By-product, $4.45@4.65; Connellsville, $4.60@4.75; Wise County, $4.50@4.65; gas coke, $3.75@4; furnace, $4.50@4.65.

MIDDLE WESTERN

GENERAL REVIEW

Market generally apathetic. Screenings in good demand. A uniform effort in all directions to maintain prices.

Dullness still characterizes the coal trade. Only a little tonnage is being absorbed by the country dealers, and contracting is sluggish. Several operators who have taken a good many contracts have stated that they will accept no more tonnage for shipment this season at prevailing prices, and there seems to be a reluctance on the part of some shippers to contract the higher grades at this time.

Mining in Indiana and Illinois is less brisk than for a number of years past. In Indiana and central Illinois a number of operators have closed down additional mines for the summer months, and state emphatically they will not be reopened until there is a better demand for coal.

The quantity of consignment coal now arriving in the Chicago market is negligible, and the few shipments received are sold without creating any disturbance. The general tendency to sustain prices is very noticeable in all grades and sizes of coal and is undoubtedly bearing fruit.

CHICAGO

Steam coals fairly steady but domestic market has practically suspended. Mines closing down. Low price Kentucky fuels a disturbing factor. Anthracite less active than anticipated.

The demand for steam coal from Franklin County mines has been steady. Screenings from this district are strong at favorable prices. Domestic sizes are inactive, but prices are maintained on such shipments as are made. Some Williamson County operators have been crushing lump coal for steam purposes. The demand for Saline County fuel has lessened as compared with other southern Illinois districts.

No change has occurred in the Indiana situation, and the demand is about on a parity with last week. It is said that the output of the Indiana mines for last year will be at least 250,000 tons less than in the year before. The demand for steam coal is better than on any other grade, and production of steam sizes about equals requirements at this time.

Springfield coal is flat. Several important operations are being closed down for the summer months.

Kentucky coals are spiritless, and several shipments have been sold here during the past week at unheard of mine prices in order to move the coal. The eastern Kentucky operators are not at all backward in meeting competition from splint coals, which has a disturbing tendency. Low prices have been made to move unsold splint coal in this market.

The smokeless situation is mixed. Some offerings have been made this week at very low prices, while other shippers are holding strong on future deliveries. No particular improvement has developed in the demand for smokeless coals during the past week. Some Maryland mine-run smokeless has been offered at a price of 70c. per ton at the mines without any takers.

Anthracite was less active during the closing days of the month than was expected, and orders thus far placed for May shipment are short of last year. The country dealers and city yards did comparatively little stocking in April.

	Williamson and Franklin Cos.	Springfield	Sullivan	Clinton	Carterville
Lump	$1.25@1.35	$1.35	$1.35@1.50	$1.30@1.50	$1.35@1.50
4-in. lump	....	....	1.35@1.45	....	....
Steam lump	....	....	1.25@1.35	1.20@1.30	....
2½-in. lump	1.20@1.30	1.20@1.30	1.25@1.35	....	....
1½-in. lump	1.25	1.25	1.25@1.40	....	....
Mine-run	1.10	1.00@1.05	1.00@1.20	1.00@1.10	....
Egg	1.25@1.35	1.30@1.35	1.30@1.45	1.20@1.30	....
No. 1 washed	1.25	....	1.65	....	1.35@1.50
No. 2 washed	1.25	....	1.75	....	1.35@1.50
6x3-in. egg	....	....	....	....	1.50
Nut	....	1.15@1.25	1.25@1.40	1.15@1.20	....
No. 1 nut	1.25@1.35	....	....	....	....
No. 2 nut	1.25@1.35	....	....	....	....
Screenings	0.85@0.90	0.80	0.80@0.95	0.75@0.80	0.90

	Saline Co.	E. Kentucky	N. Riv. & Poca.	Somerset	Hocking
Lump	$1.25@1.35	$1.30@1.40	$1.50@1.60	$1.50@1.60	1.40@1.60
1¼-in. lump	1.15@1.25	1.25@1.35	....	....	....
Mine-run	1.00@1.10	....	1.15@1.25	1.15@1.25	1.25
Egg	1.20@1.35	1.00@1.10	1.50@1.60	1.50@1.60	....
Nut	....	....	1.30@1.40	....	....
Screenings	0.75@0.85	....	....	....	....

Knox & Greene County 5-in. lump, $1.25@1.35; 3-in. lump, $1.10@1.15; 5-in. egg, $1.10@1.15; 3-in. egg, $1.10@1.15; mine-run, $1@1.05. Screenings 80 to 90c.

ST. LOUIS

Screenings holding fairly active but otherwise the market is heavy. Mine operations much curtailed.

About the only coal moving is a small tonnage for the Terminal R.R. and a few other roads that are buying on the open market. Screenings are holding up fairly well, both Standard and Carterville at about 85c. for the former and 90c. for the latter; these sizes are liable to be still stronger during the next week or so. There is absolutely no domestic demand at all, and such sizes as are moving are going to manufacturing plants at steam prices. The past week has seen a fairly large amount of anthracite moving in. There is also a little smokeless, but the tonnage is extremely light.

The current month will probably show up better than April, but there is nothing to indicate that prices will be any higher. Mines in the Standard field are working about two days a week, and a great many of them have suspended operations indefinitely. In the Williamson-Franklin County field many operations have shut down for repairs, and others are working two and three days a week.

INDIANAPOLIS

Conditions generally unchanged but some mines report an improvement. No betterment in railroad or industrial demand. Screenings sell easily at good prices.

There's nothing in the weather or other influence to make much change in the mining conditions. Operators report that the demand from railroads and factories holds to a steady level. Mining companies are watching closely for signs of material improvement in factory requirements but there is nothing marked in this direction yet. The temperature in Indiana has been ranging from 50 to 90 deg. Screenings continue in good demand at 85c. to 90c., which is an unusually good price. Most of the mines are not averaging much above half time but there are some that report a better schedule the last two weeks than for a long time in the past.

KANSAS CITY, MO.

Market down to a summer basis and no change anticipated until late in the fall.

The wholesale demand has increased slightly due to increased operations of the factories and larger industries, but the prices still remain unchanged. Only a few retail yards have any coal on hand and most of them have gone out of business for the summer. There has been a light business in supplying coal to buildings but this practically amounts to nothing. No change in the price is now looked for until late in the summer months or early in the fall.

PRODUCTION AND TRANSPORTATION STATISTICS

BALTIMORE & OHIO

The following is a statement of coal and coke tonnage moved over this system and affiliated lines during March and the previous two months:

	January		February		March	
	1915	1914	1915	1914	1915	1914
Coal	2,293,406	2,917,834	1,906,210	2,385,243	2,094,607	3,173,972
Coke	221,395	274,955	232,111	265,380	257,099	356,164
Total	2,514,801	3,192,789	2,138,321	2,650,623	2,351,706	3,530,136

FOREIGN MARKETS

GREAT BRITAIN

Still considerable uncertainty in the trade and prices high. Labor situation continues serious.

Apr. 23—There are still several very disturbing factors in the coal industry which are acting detrimentally. The threatened labor trouble in South Wales is causing considerable anxiety, while in that and other districts the shipping is difficult. Freights tend to become higher, and with many boats off the market buying is not so regular as it should be. In the Cardiff market this factor is causing a material easing in values of secondary and lower descriptions, while the same cause operates against forward business in the Newcastle market. Particulars of the Norwegian State Ry.'s contract show that about 33,000 tons have been bought, chiefly Newcastle district steams and Derbyshire coal. The price of the Derbyshire coal for shipment at Immingham is $6.48 to $6.60 f.o.b., and of best steam coals $7.44 per ton f.o.b. —"The Iron & Coal Trade Review."

May 5—Cable reports are to the effect that the exportation of coal and coke has been prohibited except to British possessions, protectorates and allied countries. There will be a committee appointed, however, to consider applications for exports to prohibited destinations.

Apr. 23—Market conditions are without improvement and the outlook for the remainder of the month is not vary satisfactory from the exporters' point of view. Tonnage arrivals are low and there are fears of pit stoppages in the near future. Quotations are approximately as follows:

Best Welsh steam	Nominal	Best Monmouthshires	$7.80@8.04
Best seconds	Nominal	Seconds	7.68@7.80
Seconds	$7.92@8.40	Best Cardiff coals	5.16@5.28
Best dry coals	8.16@8.64	Cargo smalls	4.44@4.56

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—Chartering is fairly active and rates show a further advance. Rates are approximately on the following basis:

Gibraltar	$4.80	Naples	$7.56	Las Palmas	$5.28
Marseilles	8.69	Venice	9.60	St. Vincent	5.40
Algiers	5.79	Alexandria	7.80	Rio de Janeiro	7.20
Genoa	7.56	Port Said	7.68	Monte Video	6.96
				River Plate	7.20

Note—These quotations are based on an exchange rate of 24c. to one shilling.

Financial Department

Northern Securities Co.

Pres. Jas. J. Hill reports, in part for the fiscal year ending Dec. 31, 1914, as follows:

There has been no change during the past fiscal year in the investments of the company. The net income is substantially the same as last year, the slight decrease shown being due to the payment last year of the U. S. income tax for 1913. The bills payable have been reduced $20,000 to $120,000 on Dec. 31, 1914. The directors have declared a dividend of 2% on the capital stock, payable on this date.

The regular dividend of 8% per annum has been received from the Chicago, Burlington & Quincy R.R. Co.

The Crow's Nest Pass Coal Co. has paid no dividend during the year upon its capital stock. The officers advise us that its operations during the earlier part of the year were on a satisfactory basis, but subsequently were reduced, owing to the general depression in business. Following the previous policy, the net earnings have been applied to the improvements and betterments and to the continued reduction of its floating debt.

RESULTS FOR CALENDAR YEARS

	1914	1913	1912
Dividends from C. B. & Q. RR. (reg. 8%)	$119,704	$119,704	$119,704
Dividends Crow's Nest Pass C.	.....	.....	.....
Interest	.....	.....	34
Total receipts	$119,704	$119,704	$119,738
Deduct—taxes	4,461	3,477	3,477
Administration expenses	12,592	12,909	15,521
Interest on loans	4,795	4,918	5,615
Dividends	(2) 79,072	(2) 79,072	(2) 79,068
Total deductions	$100,920	$100,377	$103,681
Balance	sur $18,784	sur $19,327	sur $16,057

BALANCE SHEET DECEMBER 31

	1914	1913	Debits—	1914	1913
Organization exp	$85,048	$85,048	Capital stock	$3,954,000	$3,954,000
Investments	a6,599,975	6,599,954	Div. unclaimed	5	5
Cash	59,757	60,922	Bills payable	120,000	140,000
			U.S. income tax	72	.....
			Surplus	b2,670,703	2,651,919
Total	$6,744,780	$6,745,924	Total	$6,744,780	$6,745,924

a The item of investments includes in 1914, 14,963 shares Chicago Burlington & Quincy R.R., valued at $2,858,788; 27,552 shares Crow's Nest Pass Coal Co., Ltd., $3,741,166 and $21 N. S. fractional scrip $22.

b Before deducting 2% dividend paid Jan. 10, 1915.

Note—For previous annual report of this company see Vol. 5, p. 390.

Lehigh & Wilkes-Barre Coal Co.

President Charles F. Huber reports under date of Sept. 24 as follows:

Results—From the surplus for the year, $3,343,478, dividends Nos. 9 and 10 were paid Dec. 22, 1913, and June 23, 1914 ($3.25 per share, or 6½%, each, making 13% for the year), aggregating $1,197,300, and leaving a balance from the year's operations of $2,146,178. Of this last amount there was appropriated for a new breaker, new general shops and supply store $500,000, and for sundry adjustments $42,977, making the balance carried to profit and loss $1,603,200.

Coal—We mined and shipped during the year 5,222,343 tons of coal, an increase of 34,122 tons, and 98,059 tons were purchased, a decrease of 443,499 tons over previous year. The tonnage of prepared sizes sold, including lump, equaled 65.93%, and of pea and smaller 34.07%.

Changes in Property Account—Surface land sold, etc. ($25,879), and depreciation of yards and wharves, marine equipment, colliery improvements and culm banks aggregated $156,720; less coal property purchased, etc., $36,068; net decrease, $120,651.

Sinking Fund for the Consolidated Loan—The amount on deposit was increased by payment June 1, 1914, of $460,000 and by $60,561 interest received from investments. Amount in fund June 1, 1914, $1,947,390, viz.: Invested in interest-bearing bonds, $1,945,974; cash, $1416.

Leases—The payments under coal leases for rentals in excess of coal mined during the current year amounted to $7786, which has been charged to operating expenses.

Improvements—The Buttonwood Colliery, acquired under purchase from the Parrish Coal Co., has been thoroughly rehabilitated and modernized, both as to outside and inside operation. The two collieries, Parrish and Buttonwood, have been connected by a tunnel and the output of Parrish will be handled through the Buttonwood breaker. The track between Inman and Buttonwood collieries has been completed and the output of Inman will also be taken to Buttonwood.

Development and improvement work has been carried on at all collieries to a large extent, so that the operations generally are in position to maintain output at a reasonable cost.

Plans are now under way for the construction of a new breaker and a general rehabilitation of the plant at Wanamie colliery. The present undersized breaker was erected in 1868.

Taxes—Taxes for the year have shown a further increase, and amounted to 20c. per ton of output. The appeals from time to time in the local courts are still pending, and no decision has yet been handed down in a case tried in January, 1913. In the interim, taxes have been paid under protest, in the hope that we may some time reach an equitable and definite basis of valuation on coal lands. In the matter of the so called tonnage tax, levied pursuant to Act of Assembly passed June 27, 1913,, appeals have been filed and no payment will be made until the validity of the Act has been finally passed upon by the courts.

TONNAGE, EARNINGS, EXPENSES, ETC.

Tonnage shipped—	1913-14	1912-13	1911-12	1910-11
From co.'s lands by co.	3,598,523	3,686,394	2,836,117	3,042,486
Leased lands by co.	1,390,418	1,361,521	1,087,109	1,104,545
Washeries by co.	233,402	140,306	62,198	137,411
Co.'s lands by tenants	756,974	884,998	844,888	967,933
Leased lands by tenants	13,522	103,372	161,001	115,024
Washeries by tenants	8,121	66,731	107,237	171,943
Total of all	6,000,961	6,243,321	5,098,552	5,539,345
Earnings—				
Coal sales	$17,930,990	$20,085,620	$18,271,001	$16,390,244
Coal mined by tenants	240,948	316,850	306,928	350,032
Miscellaneous	272,875	226,094	164,695	139,299
Total	$18,444,813	$20,628,564	$18,742,624	$16,879,575
Expenses—				
Mining coal and repairs	$8,260,921	$7,881,079	$6,450,714	$6,297,131
Colliery improvements	317,125	337,137	261,181	209,743
Royalty leased prop'ties	401,822	395,257	341,089	341,156
Coal purchased	142,060	1,246,470	1,691,392	1,756,014
Transp., yard and ag'y. exp.	3,828,542	4,451,284	3,885,289	3,876,863
General expenses	131,384	126,701	119,219	124,562
Taxes, state and local	1,018,340	691,706	689,535	631,887
Taxes, Federal	49,083	35,373	29,934	17,193
Insurance	20,484	19,781	16,386	16,180
Maintenance of prop'ty	3,952	7,676	28,058	.....
Val. of coal sold from stk.	Cr424,528	Cr172,732	1,469,465	152,657
Total	13,749,185	15,019,733	14,982,263	13,423,386
Net earnings	4,695,628	5,608,831	3,760,361	3,456,189
Deduct—				
Fixed interest on bonds	679,840	724,690	814,390	814,390
Depletion funds	672,311	461,090	460,000	460,000
Dividends (13%)	1,197,300	1,197,625	1,197,625	1,197,625
Total deductions	2,549,450	2,383,405	2,472,015	2,472,015
Surplus	2,146,178	3,225,426	1,288,346	984,174

CONDENSED BALANCE SHEET JUNE 30

Assets—	1914 $	1913 $	Liabilities—	1914 $	1913 $
Property and equip.	28,915,895	29,036,546	Capital stock	9,210,000	9,210,000
Advanced royalties for coal	1	1	Funded debt (see "Ry. & Ind." Sec.)	16,996,000	16,996,000
Cash	507,929	299,562	Depletion fund—coal lands	2,134,711	1,466,252
Cash for coup., etc	12,265	6,531	Vouch. and pay-rolls	1,051,812	908,150
Bills and accts. rec.	2,237,661	5,393,640	Coup., etc., unpaid	13,665	10,006
Coal on hand	707,288	282,760	Int., mine rents, etc., not due	1,009,964	564,991
Land contracts not due	8,092	10,076	Reserve for—New collieries	1,597,682	1,781,408
Insur., adv. payments	36,337	48,605	Breaker and shops	500,000	.....
Materials and supplies	428,502	407,116	Land susp. acct.	11,860	14,810
Securities of companies owned	371,001	281,001	Suspense accts.	79,145	59,015
Marketable securs.	5,539,616	372,596	Sink. fund income	107,390	.....
Sinking fund	1,947,390	1,426,829	Profit and loss	8,398,481	6,795,280
Suspense accts.	398,733	240,648			
Total	41,110,710	37,805,912	Total	41,110,710	37,805,912

Note—For previous annual report of this company see Vol. 5, p. 230.

Coal Contracts Pending

The purpose of this department is to diffuse accurate information of prospective purchases and prices with a view to affording equal opportunity to all, promoting market stability and inculcating sound business principles in the coal trade.

✚Indicates contracts regarding which official information has been receivrd.

Recast

In the following table we give a list of all old contracts coming up for consideration during the ensuing week. The table gives our contract number, the name of the purchaser, city, tonnage and page on which the detail notice appeared.

No.	Purchaser	City	State	Tonnage	Page
397	Board of Education	Lorain	Ohio	.....	567, 794
487	City Light & Water Plant	Reading	Ohio	2000b	665, 794
501	City Government	Sullivan	Ill.	1200b	665
534	Booth Fisheries Co.	Chicago	Ill.		708
555	Board of Education	Bridgeport	Conn.	3500a	709
556	Board of Education	Grand Rapids	Mich.	3700	709
556	Board of Education	Grand Rapids	Mich.	3750	709
557	Highway Commission	Brockton	Mass.	3000ab	709
558	Board of Education	Hamilton	Ohio	2000b	794
559	Light & Water Dept.	Bremen	Ind.	2000	708
560	Board of Education	Auburn	N. Y.	900a	709
561	Board of Education	Racine	Wis.	2000	709
562	City Government	Clarksdale	Miss.	5500	709
565	Elec. Light & Water Wks.	Whitehall	Mich.	1000	709
609	Board of Education	Munhall	Penn.	b	795

a Indicates anthracite coal. b Indicates bituminous. c Coke.

Supplemental Notes

Under this heading additional or supplemental information regarding old contracts appears, together with the page number of the original notice.

✚**No. 78—Detroit, Mich.**—Bids on this contract (pp. 275, 398) will be received until 3 p.m., May 11, instead of Mar. 1, as previously announced. Bids are to cover fuel requirements of the Public Lighting Co., for the fiscal year ending June 30, 1916. Specifications may be obtained on application. Address Secy. F. T. Bowler, Public Lighting Co., 56 East Atwater St., Detroit, Mich.

✚**No. 448—Springfield, Mass.**—Bids on this contract (p. 627), which provides for furnishing the Springfield Armory with its coal requirements during the fiscal year beginning July 1, will be received until 2 p.m., May 24 instead of Apr. 15 as previously announced. A bond for $3000 will be required of all bidders. Address Depot Quartermaster, Springfield Armory, Springfield, Mass.

✚**No. 542—Harvey, Ill.**—This contract (p. 708), which provides for furnishing the fuel requirements of the Buda Co., will be made on 6x2-in. egg instead of lump coal, as previously noted. Address Pur. Agt. L. C. Curl, the Buda Co., Harvey, Ill.

✚**No. 548—Washington, D. C.**—Bids received on this contract (p. 709), which provides for furnishing the District of Columbia with coal for the fiscal year beginning July 1 were as follows per gross ton: BITUMINOUS. James Chapman, 2000 tons of mine-run for delivery at Blue Plains, D. C., $3.78 (Jenner coal); 700 tons of mine-run for delivery at Industrial Home School and Tuberculosis Hospital, $3.88 (Jenner coal); 15,000 tons of mine-run, miscellaneous delivery, $3.45 (Jenner coal); 125 tons semibituminous (splint or lump) for delivery to Fire Department steamers, $5.64; 6000 tons of mine-run for delivery at District Pumping Plant, $3.25; same, delivered at contractors' yards, $3; 4800 tons of mine-run, delivered at Sewage Pumping Station, $3.35 (George's Creek coal). W. A. Smoot & Co., 6000 tons for delivery at the Workhouse, $3.27 (George's Creek coal); 1000 tons for use on tugboats, $3.27 (George's Creek coal); 4000 tons gas coal for same delivery, $3.38 (Fairmont). Enterprise Fuel Co., 6000 tons of mine-run for delivery at District Pumping Plant (or at the contractors' yards), $3.40 ("Quality" coal); 6000 tons of mine-run for delivery at the Workhouse, $3.23 ("Quality" coal); 1000 tons of same for use in tugboats, $3.33 ("Quality" coal); 4000 tons of gas coal for same delivery, $3.30 (Fairmont). Ward W. Griffith, 700 tons of mine-run coal for delivery at the Industrial Home School, $3.75 (Jenner coal). Commercial Coal Co., 15,000 tons of mine-run for miscellaneous delivery, $3.76 (White Oak New River coal, and $3.61 for Borman coal); 2500 tons for delivery at District Building, $3.49 (White Oak New River coal). John P. Agnew & Co., 6000 tons of mine-run coal for delivery at the Workhouse, $3.39 (New River coal); 1000 tons of same for use on tugboat, $3.36 (Orenda coal); 4000 tons of gas coal for same delivery, $3.37 (Fairmont or Mt. Carbon coal). Walter H. Marlow, 15,000 tons for miscellaneous delivery, $3.65 (Jenner coal); 6000 tons of mine-run for delivery at District Pumping Station (or at contractors' yards), $3.33; 2500 tons for delivery at District Buildings, $2.98 (Jenner coal); 4800 tons of mine-run for delivery at Sewage Pumping Stations, $3.53 (Jenner coal). ANTHRACITE. James Chapman, 650 tons of red ash stove, $7.38; 100 tons of white ash chestnut, $7.12; 5000 tons of white ash egg, $6.23; 1000 tons of white ash furnace, $5.94; 1400 tons of white ash stove, $6.98; 550 tons of white ash furnace, $6.23. Walter H. Marlow, 650 tons of red ash stove, $7.45; 100 tons of white ash chestnut, $7.10; 5000 tons of white ash chestnut, $6.24; 1000 tons of white ash furnace, $5.98; 1400 tons of white ash stove, $6.98; 550 tons of white ash furnace coal, $6.38. All anthracite bids submitted were for Philadelphia & Reading coal. Address Purchasing Officer, District of Columbia, Room 320 District Bldg., Washington, D. C.

✚**No. 558—Hamilton, Ohio**—Bids on this contract (pp. 709, 794), which provides for furnishing the local Board of Education with its fuel requirements during the ensuing year, will be received until noon, May 19, instead of May 12, as previously announced. Address Clk. Charles F. Holdefer, Board of Education, Hamilton City School District, Hamilton, Ohio.

✚**No. 577—Davenport, Iowa**—The Davenport Water Co. has already covered its coal requirements until Apr. 1, 1916 (p. 749) and will not again be in the market until that time. Address Davenport Water Co., Davenport, Iowa.

✚**No. 586—Utica, N. Y.**—The bids on this contract (p. 749), which provides for furnishing the various city departments with coal, were as follows: Emil J. George, egg, $6.10@6.60; nut, $6.35@6.85. Clark-Davis Coal Co., stove, $6.10@6.60; nut, $6.35@6.85. Sang & Reusswig, pea, $5@5.25; buckwheat, $3.75. Address Secy. of the Bd. of Contract and Supply Walter W. Briggs, City Hall, Utica, N. Y.

✚**No. 638—Baltimore, Md.**—The bids on this contract (p. 796), which provides for supplying the vessels in the United States Coast Guard are opened at the office of the collector at this port, and forwarded at once to the Coast Guard depot at Washington. Address Collector W. S. Ryan, Custom House, Baltimore, Md.

✚**No. 653—Toronto, Can.**—Tenders on this contract (p. 709), which provides for furnishing the fuel requirements of the Canadian Pacific Bldg., have been called for and contracts may be let at any time. Address Canadian Pacific Ry.. King and Yonge Sts., Toronto, Can.

New Business

✚**No. 640—Fall River, Mass.**—The City Government at this place will be in the market on June 1 for about 8000 tons of anthracite and bituminous coal. The current contract was closed at $6.80 per ton for the anthracite, and $4.50 for the bituminous. The call for bids is advertised and the purchase made through local dealers. Address Superintendent of Public Buildings, City Hall, Fall River, Mass.

✚**No. 641—Detroit, Mich.**—The Board of Education at this place will receive bids until noon, May 7, for furnishing coal as follows: Anthracite, 400 tons; 2500 tons of large bituminous; for delivery at 20 different schools; 150 tons of large size semi-bituminous for delivery at one school; 23,000 tons of small size bituminous for delivery at 95 different schools. All the anthracite coal that can be received and stored must be delivered during July and August, and 75% of the bituminous coal must be delivered before Sept. 1. Bidders on the bituminous contract must furnish a certified check for $500 and the successful bidder will be required to furnish a bond for $10,000. Payments will be made on an analysis basis.

Specifications and proposal blanks may be had on application Address Secy. Charles A. Gadd, Board of Education, Detroit, Mich.

+ No. 642—River Rouge, Mich.—Sealed proposals will be received until 7 p.m., May 11, for furnishing about one car per week of West Virginia mine-run coal to the City Lighting Plant at this place. Bids should be made f.o.b. on cars at the Municipal Lighting Plant switch. All bids must be accompanied by a certified check for $200. Address Village Clk. Louis Laginess, River Rouge, Mich.

+No. 643—Lansing, Mich.—Bids will be received by the state Board of Education, until noon, May, 15, for furnishing approximately 5000 tons of coal, for the normal schools at Ypsilanti, Kalamazoo and Mt. Pleasant. Address Secy. Fred L. Keeler, State Board of Education, Lansing, Mich.

+No. 644—Fort Hancock, N. J.—Proposals will be issued about May 15 by the U. S. Army to supply the fuel requirements at this place for the ensuing year. The tonnages involved are as follows: 2000 tons of buckwheat No. 1, 1400 tons of pea, 200 tons of stove, 450 tons of broken and 200 tons of bituminous. Address Commanding Officer, Sandy Hook Proving Ground, Fort Hancock, N. J.

No. 645—Toronto, Can.—The Toronto University buildings here, will receive bids until May 15, for furnishing coal during the fiscal year. Bids are requested on 8000 tons of bituminous and 4000 tons of hard coal, for use in connection with the various buildings and faculties. The contract is usually closed at about $3.35 per ton delivered. Address, Supt. Graham Campbell, Toronto University, Toronto, Ont.

+No. 646—Atlanta, Ga.—The City Government at this place will be in the market some time during June for 2750 tons of coal. The current contract was let at $3.60 per ton. The call for bids is usually advertised. Address Pur. Agt. W. E. Chambers, City Hall, Atlanta, Ga.

+No. 647—Worcester, Mass.—The County Commissioners of this place will receive bids until 10:30 a.m., May 11, for coal as follows: On cars at Shrewsbury St. siding 600 tons of Georges Creek; in bins at Court House, 300 tons best quality of white ash egg (this order may be filled immediately); on cars at Oakdale, 100 tons of Georges Creek, and 30 tons of best quality white ash stove coal. All bids should be submitted on a gross ton basis. Address County Commissioners, Court House, Worcester, Mass.

No. 648—Toronto, Can.—St. Andrews College in this city is now in the market for a year's supply of coal and tenders will close about the middle of May. The annual consumption amounts to 400 tons of soft smokeless and 100 tons of anthracite, delivery to be made to premises. Address, Supt. C. Bruce Macdonald, St. Andrews College, Toronto, Ont., Can.

No. 649—New Orleans, La.—Bids will be received by the Lighthouse Inspector, New Orleans, La., until 2 p.m., May, 24, for furnishing bituminous coal delivered in vessels of the lighthouse service at Galveston, Tex. Address Lighthouse Inspector, New Orleans, La.

+No. 650—Pittsburgh, Penn.—The local Board of Eudcation will be in the market some time during May or June for its annual requirements of coal, aggregating about 14,000 tons. Deliveries are to be made by wagon. The requirements provide for 1¼-in. slack, 1¼-in. lump, mine-run, anthracite and smokeless, and prices on the current contract varied from $1.80 to $6 per ton. The call for bids is advertised. Address Supt. of Supplies C. M. McKee, Fulton Bldg., Pittsburgh, Penn.

No. 651—Toronto, Can.—The Canada Bread Co. expects to be into the market for 800 tons of hard and 600 tons of soft coal about the middle of the current month. The award is made on a competitive basis. Address Gen. Mgr. Canada Bread Co., Toronto, Ont., Can.

No. 652—Waverly, Iowa—The Kelly Canning Co. at this point is in the market for their coal requirements for the ensuing year. They prefer 6-in. lump, or smaller size, clean and free from soot and clinkers and from Southern Illinois mines. They use from two to four cars per month. Address Purchasing Agent, Kelly Canning Co., Waverly, Iowa.

No. 653—Toronto, Can.—The Canadian Pacific Ry. Building will ask for tenders early in the current month for furnishing the coal supply for the ensuing year. Bids will be asked for 3900 odd tons of slack to be delivered according to requirements. Address Building Supt. Canadian Pacific Ry., Toronto, Can.

+No. 654—White Bear, Minn.—Sealed proposals were received by the Local School Board until May 3, for furnishing 135 tons of Hocking mine-run coal and 35 tons of anthracite egg to be delivered at school buildings as required. Address Clk. J. A. Milner, Independent School Board, District No. 5, Washington School Bldg., White Bear, Minn.

+No. 655—Minneapolis, Minn.—The State Government is in the market for 110,000 tons of coal, delivery to be made at 16 institutions in various parts of the state. Address, State Board of Control, Capitol Building, St. Paul, Minn.

+No. 656—Murphysboro, Ill.—Murphysboro Water Works, Electric & Gas Light Co. will be in the market about the middle of the current month for their annual requirements of coal involving approximately 12,000 tons of screenings. Address Supt. W. O. Settle, Murphysboro Water Works, Electric & Gas Light Co., Murphysboro, Ill.

+No. 657—Nashua, N. H.—The City Government at this place will contract some time next month for their annual requirements of coal involving about 11,000 tons of broken and stove anthracite. The business is usually closed at about $8 per ton, and the call for bids is advertised. Address the Mayor, Nashua, N. H.

+No. 658—Sheldon, Iowa—The City Council will receive bids until 6 p.m., May 10, for furnishing the coal requirements during the ensuing year. Address City Clk. Scott Martin Sheldon, Iowa.

+No. 659—Philadelphia, Penn.—The Lighthouse Service at this place will receive sealed proposals until May 10 for furnishing their coal requirements for the fiscal year beginning June 30. Both anthracite and bituminous coal will be required. Blank proposals and particulars may be obtained on application. Address the Lighthouse Inspector, Philadelphia, Penn.

+No. 660—Medford, Mass.—Sealed proposals will be received until 9 a.m., May 11, for furnishing the coal requirements of the City Hall and Annex. Bids are to include cost of delivery in bins. Address City Messenger Edwin D. Curran, City Hall, Medford, Mass.

+No. 661—Passaic, N. J.—Bids are being received by the Board of Education at this place for furnishing the coal requirements to the Public School buildings during the next year. Specifications and lists of the approximate quantities required may be had on application. All bids must be accompanied by a suitable bond. Address Bus. Mgr. John F. Kelly, Board of Education, Passaic, N. J.

+No. 662—Woodstock, Ill.—The City Light & Water Plant at this place will be in the market some time next month for their annual requirements of coal involving about 8500 tons of Illinois bituminous. The call for bids is advertised, and the business usually goes at $2.55 per ton f.o.b. Woodstock. Address Engr. E. A. Reynolds, the City Electric Light & Water Plant, Woodstock, Ill.

+No. 663—Nelsonville, Ohio—The City Power Plant at this place will be in the market some time during next month for their annual requirements of coal involving about 5000 tons of mine-run. The business is usually let at $1.32. Address E. A. Mills, the City Power Plant, Nelsonville, Ohio.

+No. 664—Washington, D. C.—Sealed bids will be received until 10 a.m., May 15, for furnishing the U. S. Navy with coal during the fiscal year, beginning July 1, approximately as follows: SEMIBITUMINOUS. For delivery at the Brooklyn Navy Yard, 45,000 tons; for delivery at the Brookyln Navy Yard, or on board vessels at such time and such places as may be required, 50,000 tons; for deliveries of three different kinds at Philadelphia, 45,000 tons; same, 35,000 tons; for delivery at Baltimore or at Annapolis, Md., 7500 tons; for deliveries of various kinds at Baltimore, Md., or within the harbor limits, 75,000 tons; for delivery at the Navy Yard, Washington, D. C., 7500 tons; for delivery f.o.b. vessels or barges at either Hampton Roads or Philadelphia, 400,000 tons; for delivery f.o.b. cars at the Navy Yard, 7 miles from Charleston, S. C., 8000 tons; for delivery to the U. S. Navy in Charleston Harbor, 4000 tons; for delivery alongside wharf, Mattawoman Creek, Indianhead, Md., 25,000 tons. BITUMINOUS AND SEMIBITUMINOUS. For delivery at such times and in such quantities as may be required at the Naval Hospital, Chelsea, Mass., 2500 tons; for delivery at naval powder depot, Lake Denmark, Morris County, N. J., 1300 tons; for delivery on the grounds of the Naval Engineering Experiment Station, adjacent to Annapolis, Md., 1500 tons; for delivery to the Naval Academy, Annapolis, Md., 12,000 tons; for delivery to the Naval Hospital, Washington, D. C., 2500 tons; for delivery at the Navy Yard, Washington, D. C., 30,000 tons; for delivery at the Navy Yard, Norfolk (Portsmouth), Va., 15,000 tons; for delivery at the Naval Hospital, Norfolk, Va., 2500 tons; for delivery at the Naval Training Station, Great Lakes, Ill., 13,000 tons (an alternate bid f.o.b. mine is requested on this item); for delivery f.o.b. cars, Navy Yard, South Carolina (seven miles from Charleston), 10,000 tons; for delivery at West Annapolis siding, 1000 tons; for delivery at the Navy Yard, Pensacola (Warrenton), Fla., 3000 tons. A satisfactory guarantee or certified check for 25% of the full amount of the bid must accompany each pro-

posal. The business will all be done on a specification basis, and payments will be made on an absolute heat unit basis. Address Paymaster Gen. of the Navy Samuel McGowan, Washington, D. C.

No. 665—Watseka, Ill.—The Iroquois Hospital at this point is in the market for its fuel requirements for the coming season. Address Trustee, Iroquois Hospital, Watseka, Ill.

✚No. 666—Albany, N. Y.—The Board of Contract and Supply at this place is advertising for bids for coal to supply the park house, city buildings, baths and board of education. Address the Bd. of Contract and Supply, Albany, N. Y.

✚No. 667—Worcester—The City Hospital at this place will receive bids until 2 p.m. May 10, for furnishing from 1600 to 2000 tons of bituminous and 100 tons of anthracite coal. The bituminous coal will be subjected to an evaporation test, and the anthracite is to be the best quality Lackawanna coal. All dealers submitting bids must furnish samples of two tons to be delivered as may be required. Quotations are to cover the cost of delivery in bins. Address Matthew J. Whittall, City Hospital, Worcester, Mass.

✚No. 668—New York, N. Y.—Sealed bids will be received until 10:30 a.m. May 11 by the Borough of Bronx for furnishing and delivering white ash, anthracite and Cumberland coal in quantities specified until Mar. 31, 1916. Blank forms for bids may be obtained upon application and specifications will be shown those interested. Security aggregating 30% of the total amount of the contract will be required. Address Pres. Douglass Matthewson, Crotona Park, 177th St. and Third Ave., New York City.

✚No. 669—Sleepy Eye, Minn.—The City Government at this place has requested bids for approximately 1000 tons of steam coal for use in the electric plant. Prices should be quoted f.o.b. Sleepy Eye. Bids were received up to 8 p.m. May 5, and the contract is to run for the fiscal year beginning May 10. Address Recorder, H. Peterson, City Council, Sleepy Eye, Minn.

✚No. 670—Seattle, Wash.—Sealed proposals will be received for furnishing coal for Coast and Geodetic Survey steamers "Patterson," "Explorer," "McArthur," "Gedney," and "Taku," at different points in Alaska during the coming summer. Particulars and date of opening bids may be had on application. Address Capt. J. F. Pratt, Inspector, Coast and Geodetic Survey, 204 Burke Building, Seattle, Wash.

✚No. 671—Chicago, Ill.—The South Park Commissioners will receive bids until noon May 19, for furnishing the coal required in the South Park System for the fiscal year beginning June 30. Specifications may be obtained on application. Address South Park Commissioners, Chicago, Ill.

✚No. 672—Charleston, S. C.—Sealed proposals will be received at the office of the lighthouse inspector, Charleston, S. C., for furnishing steam coal and stove coal (anthracite), as required during the fiscal year ending June 30, 1916, delivered at Charleston, S. C. Blank proposals and particulars may be obtained on application. Address Lighthouse Inspector, Charleston, S. C.

✚No. 673—Buffalo, N. Y.—Sealed bids will be received until 10 a.m. May 8, for supplying the fuel required by the City Poor Department. Deliveries are to be made in half-ton lots, and the amount used last year amounted to 2425 tons. Address Overseer of Poor Louis J. Kengott, Buffalo, N. Y.

✚No. 674—New York—Sealed bids were received until May 6, to supply the fuel requirements of the Board of Education at this place. The tonnage involved aggregates approximately 84,160 gross tons of anthracite and 4700 tons of semibituminous. Deliveries are to be completed on or before Mar. 31, 1916. Delivery is to be made in such quantity and at such time as may be directed. Address Supt. of School Supplies Patrick Jones, Park Ave. and 59th St., New York City.

✚No. 675—Seattle, Wash.—Sealed bids were received until 2 p.m., May 5, for furnishing the coal required by vessels of the Coast Guard for delivery at either Seattle or Port Townsend (at the option of the bidder). Deliveries to be made as required during the fiscal year beginning June 30. Blank forms and proposal sheets may be had on application. Address the Collector of the Custom House, Seattle, Wash.

Awards

Note—The names of successful bidders are noted in **full face** type.

No. 67—Schenectady, N. Y.—Some of the bids and the award on this contract (p. 398), which provides for furnishing the Board of Education with its fuel requirements for the ensuing year, were: Walter S. Wood Coal Co., $5.90 to $6.24 on stove coal; Milton E. Devoe, $6.44 for stove and $3.84 for bituminous; Horstman & Meyer, $6.20 to $6.25; J. M. Gaffers, $6.50 for stove and $3.09 for bituminous; Zeiser & Magee, $6.56 on stove coal; **Devenpeck Coal Co.**, $5.90 for stove and $2.85 for bituminous; this company, which was awarded the contract, also bid $6.15 on 150 tons of chestnut. Address Board of Contracts and Supplies, Board of Education, Schenectady, N. Y.

✚No. 188—Sturgeon Bay, Wis.—This contract (p. 399), which provides for furnishing the local Utility Commission with approximately 4000 tons of coal will be bought through the **Drake Coal Co.** under practically the same conditions as the last contract. The cost of the coal laid down at the point of consumption is estimated at $3.39 per ton. Address Supt. James B. Johnson, Sturgeon Bay Utility Commission, Sturgeon Bay, Wis.

✚No. 514—Springfield, Ill.—The award on this contract (p. 666), which provides for furnishing the local School Board with its annual requirements of coal were made to **Emil J. George** for supplying the City Hall, police and fire stations and the East Utica bathhouse, and to **Sang & Reusswig** and the **Clark-Davis Coal Co.**, for supplying the General Hospital and Bureau of Out-Door Relief. Representative bids made on this business for April to September deliveries were: Egg, $6.10; chestnut, $6.35; stove, $6.10; egg and stove, $6.10; bituminous, $3.75. For delivery September to January to April, egg, $6.60; chestnut, $6.85; stove, $6.60; egg and stove, $6.60; bituminous, $3.75. Address Committee on Supplies, Leland Office Building, 6th floor, Springfield, Ill.

✚No. 519—Seattle, Wash.—This contract (p. 666), which provides for furnishing fuel requirements for the quartermaster corps at Seattle and Tacoma, during the fiscal year 1915, has been awarded as follows: **Wellington Coal Co.**, Comox washed pea coal for steaming $3.20; **Pacific Coast Coal Co.**, domestic Newcastle, $6.50. Prices are per net ton. Address Col. George B. Davis, Depot Quartermaster's Office, Seattle, Wash.

✚No. 525—Washington, D. C.—This contract (p. 666), which provides for furnishing Navy Department with 100,000 tons of coal, has been awarded to the **Maryland Coal & Coke Co.**, of Philadelphia, who were the lowest bidders at $2.73 per ton. Address Paymaster-General of the Navy Samuel McGowan, Washington, D. C.

✚No. 532—Cincinnati, Ohio—This contract (p. 666), which provides for furnishing the local Water Works Department with coal, has been awarded to the **Reliance Coal & Coke Co.**, the gross consideration being $20,870.50. Address Dir. of Pub. Ser. Philip Fosdick, City Hall, Cincinnati, Ohio.

✚No. 555—Bridgeport, Conn.—This contract (p. 709), which provides for furnishing not only the fuel requirements of the Board of Education but other city buildings as well, has been let to **Patrick McGee,** at $5.70 for stove, nut and egg for delivery at the various schools and city buildings and $6 per ton for delivery in quarter-ton lots as may be required by the Board of Charities. Other bidders on this contract were Gregory Coal Co. at $6 and $7; J. A. Black Coal Co., egg and stove, $6.25, nut $6.50, before Sept. 1, with egg and stove at $6.50 and nut at $6.75 and $7.40 thereafter; Wheeler & Howe Coal Co., egg $5.95, stove $6.25, nut $6.75 and $7.40; Sprague Ice & Coal Co., egg, stove and nut $5.55 and $6.40; Berkshire Mills Co., stove $6, nut $6.25 and $7.20. The contract last year was awarded to the Sprague Ice & Coal Co., who were the second lowest bidders this year. Address Board of Contract and Supply, City Hall, Bridgeport, Conn.

Contract Notes

South America—The commercial attachés of the Department of Commerce in South America have cabled the Bureau of Foreign and Domestic Commerce that there is an opportunity for the sale of 380,000 tons of coal at this point. Full details may be had on application.

New Orleans—The New Orleans Coal Co. has just renewed an annual contract to coal the ships of the Southern Pacific Co. in the New York and Havana service. The contract calls for approximately 50,000 tons of Pratt coal per annum.

Buffalo, N. Y.—Spaulding & Spaulding were the low bidders and were awarded the contract for 1300 tons of anthracite for the Buffalo park board. George J. Meyer is Park Commissioner.

Charlotte, N. C.—Coal buying committee of the South Carolina Cotton Manufacturing Association has placed the annual contract with the Clinchfield Fuel Co. of Spartanburg, S. C. The contracts include a year's supply for the majority of the cotton mills of the state and will amount to about 275,000 tons. Largest companies in the bidding were the Virginia Iron & Coke Co., the Stonega Coal Co., Blackwood Coal & Coke Co., Bewley Darst Coal Co., Royal Consolidated Coal Co. and the Clinchfield Fuel Co.